*Filed by:*
*Kri Pelletier, Property Specialist - SBA Communications*
*134 Flanders Rd., Suite 125, Westborough, MA 01581*
*508.251.0720 x 3804 - kpelletier@sbasite.com*

November 13, 2018

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

**Notice of Exempt Modification**
**10 Redwood Lane**
**Avon, CT 06001**
**T-Mobile Site #: CT11380C_L700-4x2**
**N 41 46 21 / W -72 52 48**

Dear Ms. Bachman:

T-Mobile currently maintains antennas at the 105-foot level of the existing 105-foot Monopole Tower at 10 Redwood Lane in Avon, CT. The tower is owned by SBA Towers, LLC. The property is owned by the Avon Water Company. T-Mobile now intends to replace (6) existing antennas with (6) newer technology antennas at the 105--foot level of the tower. The proposed full scope of work is as follows:

Remove:

- (1) 1-5/8" line

Remove and Replace:

- Remove: (3) Ericsson AIR B4A B2P – Panel Antennas
  - Replace with: (3) Ericsson - AIR32 KRD901146-1_B66A (Octa)Panel Antennas
- Remove: (3) Commscope LNX-6515DS – Panel Antennas
  - Replace with: (3) RFS - APXVAARR24_43-U-NA20 (Octa)- Panel Antennas
- Remove: (3) Ericsson KRY 112 144 – TMAs
  - Replace with: (3) Ericsson KRY 112 144/2 TMAs
- Remove: (3) Ericsson S11B12 – RRUs
  - Replace with (3) Ericsson Radio 4449 B71 + B12
- Remove: (1) 1-5/8" fiber
  - Replace with: (2) 1-1/4" hybrid

Install:

- (1) Perfect 10 Kicker Kit (PV-PKBK) and (1) Collar Mount (PV-RM3060) and Inner bracing members

Existing Equipment to Remain (Including entitlements):

- (3) Ericsson AIR B2A B4P – Panel Antennas
- (1) Low Profile Platform
- (11) 1-5/8" lines

This facility was approved prior to the Council's jurisdiction by the Town of Avon. Special Permit was issued 7/25/00 to remove an existing 80 foot tower and replace with a 110' tower. A 50,000 removal bond was to be issued. Approval was given for five antenna clusters on the tower along with ancillary cabinets and sheds. This modification complies with all conditions.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies §16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. §16.50j-72(b)(2). In accordance with R.C.S.A. § 16.50j-73, a copy of this letter is being sent to the Town of Avon's Town Manager, Brandon Robertson, and Director of Planning and Community Development, Hiram Peck, as well as to the property owner, Avon Water Company (with copy to Farmington Woods Master Association.) (Separate notice is not being sent to tower owner, as it belongs to SBA.)

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. §16.50j-72(b)(2).

1. The proposed modifications will not result in an increase in the height of the existing structure.
2. The proposed modification will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.
5. The proposed modification will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The existing structure and its foundation can support the proposed loading.

For the foregoing reasons, T-Mobile respectfully submits that the proposed modifications to the above-referenced telecommunication facility constitute an exempt modifications under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kri Pelletier
Property Specialist
SBA COMMUNICATIONS CORPORATION
134 Flanders Rd., Suite 125
Westborough, MA 01581
508.251.0720 x3804 + T
508.366.2610 + F
kpelletier@sbasite.com
Attachments
cc: Brandon Robertson, Town Manager / with attachments
*Avon Town Hall, 60 West Main Street, Avon, CT 06001*
Hiram Peck, Director of Planning and Community Development / with attachments
*Avon Town Hall, 60 West Main Street, Avon, CT 06001*
Avon Water Company / with attachments
*P.O. Box 424 Avon CT 06001*
Farmington Woods Master Association / with attachments
*200 Byron Drive, Avon, CT 06001*

## POWER DENSITY

### T-Mobile Site Inventory and Power Data by Antenna

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | 1 | Antenna #: | 1 | Antenna #: | 1 |
| Make / Model: | Ericsson AIR32 | Make / Model: | Ericsson AIR32 KRD901146- | Make / Model: | Ericsson AIR32 KRD901146- |
| Gain: | 15.9 | Gain: | 15.9 dBd | Gain: | 15.9 dBd |
| Height (AGL): | 105 | Height (AGL): | 105 | Height (AGL): | 105 |
| Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) |
| Channel Count | 4 | Channel Count | 4 | Channel Count | 4 |
| Total TX | 20 | Total TX | 20 | Total TX | 20 |
| ERP (W): | 7,780.9 | ERP (W): | 7,780.9 | ERP (W): | 7,780.9 |
| Antenna A1 MPE% | **2.8** | Antenna B1 MPE% | **2.8** | Antenna C1 MPE% | **2.8** |
| Antenna #: | **2** | Antenna #: | **2** | Antenna #: | **2** |
| Make / Model: | Ericsson AIR21 | Make / Model: | Ericsson AIR21 | Make / Model: | Ericsson AIR21 |
| Gain: | 15.9 | Gain: | 15.9 dBd | Gain: | 15.9 dBd |
| Height (AGL): | 105 | Height (AGL): | 105 | Height (AGL): | 105 |
| Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) |
| Channel Count | 2 | Channel Count | 2 | Channel Count | 2 |
| Total TX | 5 | Total TX | 5 | Total TX | 5 |
| ERP (W): | 2,139.7 | ERP (W): | 2,139.7 | ERP (W): | 2,139.7 |
| Antenna A2 MPE% | **0.7** | Antenna B2 MPE% | **0.7** | Antenna C2 MPE% | **0.7** |
| Antenna #: | **3** | Antenna #: | **3** | Antenna #: | **3** |
| Make / Model: | RFS APXVAARR24_43-U- NA20 | Make / Model: | RFS APXVAARR24_43-U- NA20 | Make / Model: | RFS APXVAARR24_43-U- NA20 |
| Gain: | 12.95 / 13.35 dBd | Gain: | 12.95 / 13.35 dBd | Gain: | 12.95 / 13.35 dBd |
| Height (AGL): | 105 | Height (AGL): | 105 | Height (AGL): | 105 |
| Frequency Bands | 600 MHz / 700 MHz | Frequency Bands | 600 MHz / 700 MHz | Frequency Bands | 600 MHz / 700 MHz |
| Channel Count | 4 | Channel Count | 4 | Channel Count | 4 |
| Total TX | 12 | Total TX | 12 | Total TX | 12 |
| ERP (W): | 2,443.0 | ERP (W): | 2,443.0 | ERP (W): | 2,443.0 |
| Antenna A3 MPE% | **2.1** | Antenna B3 MPE% | **2.1** | Antenna C3 MPE% | **2.1** |

| Site Composite MPE% | |
|---|---|
| **Carrier** | **MPE%** |
| T-Mobile (Per Sector Max) | **5.77 %** |
| AT&T | **4.27 %** |
| MetroPCS | **2.41 %** |
| Clearwire | **0.26 %** |
| Sprint | **0.05 %** |
| Farm. Woods | **1.20 %** |
| **Site Total MPE %:** | **13.96 %** |

| | |
|---|---|
| T-Mobile Sector A Total: | 5.77 % |
| T-Mobile Sector B Total: | 5.77 % |
| T-Mobile Sector C Total: | 5.77 % |
| | |
| Site Total: | 13.96 % |

| T-Mobile _Frequency Band / Technology (Per | # Channe | Watts ERP (Per | Height (feet) | Total Power Densi | Frequen cy | Allowab le MPE | Calculated % |
|---|---|---|---|---|---|---|---|
| T-Mobile PCS - 1900 MHz LTE | 2 | 1,556.18 | 10 | 11. | PCS - 1900 | 1000.00 | 1.14% |
| T-Mobile AWS - 2100 MHz | 2 | 2,334.27 | 10 | 17. | AWS - 2100 | 1000.00 | 1.71% |
| T-Mobile PCS - 1900 MHz | 1 | 583.57 | 10 | 2. | PCS - 1900 | 1000.00 | 0.21% |
| T-Mobile AWS - 2100 MHz | 1 | 1,556.18 | 10 | 5. | AWS - 2100 | 1000.00 | 0.57% |
| T-Mobile 600 MHz LTE | 2 | 788.97 | 10 | 5. | 600 MHz | 400.00 | 1.45% |
| T-Mobile 700 MHz LTE | 2 | 432.54 | 10 | 3. | 700 MHz | 467.00 | 0.68% |
| | | | | | | Tota | 5.77% |

*NOTE: Totals may vary by 0.01% due to summing of remainders


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# Property at 00010 REDWOOD LANE Prop ID 3680010

**Administrative Information**

| | |
|---|---|
| Owner name: | AVON WATER COMPANY |
| Second name: | C/O CONNECTICUT WATER CO |
| Address: | 93 WEST MAIN STREET |
| City/state: | CLINTON CT Zip: 06413 |

**Location Information**

| | | | |
|---|---|---|---|
| Map: | Clerk map: | | |
| Lot: 3680010 | Neigh.: FW | Zone: | Vol: 218 Page: 362 |

| Assessments | | | Exemptions | | | Last sale | |
|---|---|---|---|---|---|---|---|
| Assmt category | Qty | Amount | Exempt | Cat | Amount | Sale date: | 02-Feb-1989 |
| Pub Util Land | 1.00 | 7,000 | | | | Sale price: | |
| | | | | | | Sale valid: | |
| | | | | | | Values | |
| | | | | | | Mkt value : | |
| | | | | | | Cost value: | 10,000 |

| Summary | | Utilities | | Sales ratios | |
|---|---|---|---|---|---|
| Total assessments | 7,000 | Water | None | Cost/sale : | |
| Total exemptions | | Sewer | None | Mkt/sale : | |
| Net assessment | 7,000 | Gas | None | Assmt/sale: | |

Card 01 Street Card Sales History Home Page

EBI Consulting
environmental | engineering | due diligence

# RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
# EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11380C

SBA Avon/RT 177
10 Redwood Lane
Avon, CT 06001

**November 1, 2018**

**EBI Project Number: 6218006474**

| Site Compliance Summary | |
|---|---|
| Compliance Status: | COMPLIANT |
| Site total MPE% of FCC general population allowable limit: | 13.96 % |

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

November 1, 2018

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11380C – SBA Avon/RT 177**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **10 Redwood Lane, Avon, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general population may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

## CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **10 Redwood Lane, Avon, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 1 GSM channels (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 15 Watts per Channel.

2) 1 UMTS channel (AWS Band – 2100 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

3) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

4) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

6) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.

7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

8) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antennas used in this modeling are the **Ericsson AIR32 KRD901146-1 B66A/B2A** & **Ericsson AIR21 KRC118023-1 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **RFS APXVAARR24_43-U-NA20** for 600 MHz and 700 MHz channels. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerline of the proposed antennas is **105 feet** above ground level (AGL).

11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

12) All calculations were done with respect to uncontrolled / general population threshold limits.

## T-Mobile Site Inventory and Power Data

| Sector: | A | Sector: | B | Sector: | C |
|---|---|---|---|---|---|
| Antenna #: | **1** | Antenna #: | **1** | Antenna #: | **1** |
| Make / Model: | Ericsson AIR32 KRD901146-1 B66A/B2A | Make / Model: | Ericsson AIR32 KRD901146-1 B66A/B2A | Make / Model: | Ericsson AIR32 KRD901146-1 B66A/B2A |
| Gain: | 15.9 dBd | Gain: | 15.9 dBd | Gain: | 15.9 dBd |
| Height (AGL): | 105 feet | Height (AGL): | 105 feet | Height (AGL): | 105 feet |
| Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) |
| Channel Count | 4 | Channel Count | 4 | Channel Count | 4 |
| Total TX Power(W): | 200 | Total TX Power(W): | 200 | Total TX Power(W): | 200 |
| ERP (W): | 7,780.90 | ERP (W): | 7,780.90 | ERP (W): | 7,780.90 |
| Antenna A1 MPE% | **2.85** | Antenna B1 MPE% | **2.85** | Antenna C1 MPE% | **2.85** |
| Antenna #: | **2** | Antenna #: | **2** | Antenna #: | **2** |
| Make / Model: | Ericsson AIR21 KRC118023-1 B2A/B4P | Make / Model: | Ericsson AIR21 KRC118023-1 B2A/B4P | Make / Model: | Ericsson AIR21 KRC118023-1 B2A/B4P |
| Gain: | 15.9 dBd | Gain: | 15.9 dBd | Gain: | 15.9 dBd |
| Height (AGL): | 105 feet | Height (AGL): | 105 feet | Height (AGL): | 105 feet |
| Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) | Frequency Bands | 1900 MHz (PCS) / 2100 MHz (AWS) |
| Channel Count | 2 | Channel Count | 2 | Channel Count | 2 |
| Total TX Power(W): | 55 | Total TX Power(W): | 55 | Total TX Power(W): | 55 |
| ERP (W): | 2,139.75 | ERP (W): | 2,139.75 | ERP (W): | 2,139.75 |
| Antenna A2 MPE% | **0.78** | Antenna B2 MPE% | **0.78** | Antenna C2 MPE% | **0.78** |
| Antenna #: | **3** | Antenna #: | **3** | Antenna #: | **3** |
| Make / Model: | RFS APXVAARR24_43-U-NA20 | Make / Model: | RFS APXVAARR24_43-U-NA20 | Make / Model: | RFS APXVAARR24_43-U-NA20 |
| Gain: | 12.95 / 13.35 dBd | Gain: | 12.95 / 13.35 dBd | Gain: | 12.95 / 13.35 dBd |
| Height (AGL): | 105 feet | Height (AGL): | 105 feet | Height (AGL): | 105 feet |
| Frequency Bands | 600 MHz / 700 MHz | Frequency Bands | 600 MHz / 700 MHz | Frequency Bands | 600 MHz / 700 MHz |
| Channel Count | 4 | Channel Count | 4 | Channel Count | 4 |
| Total TX Power(W): | 120 | Total TX Power(W): | 120 | Total TX Power(W): | 120 |
| ERP (W): | 2,443.03 | ERP (W): | 2,443.03 | ERP (W): | 2,443.03 |
| Antenna A3 MPE% | **2.13** | Antenna B3 MPE% | **2.13** | Antenna C3 MPE% | **2.13** |

| **Site Composite MPE%** | |
|---|---|
| **Carrier** | **MPE%** |
| T-Mobile (Per Sector Max) | **5.77 %** |
| AT&T | **4.27** % |
| MetroPCS | **2.41** % |
| Clearwire | **0.26** % |
| Sprint | **0.05** % |
| Farm. Woods | **1.20** % |
| **Site Total MPE %:** | **13.96 %** |

| | |
|---|---|
| T-Mobile Sector A Total: | 5.77 % |
| T-Mobile Sector B Total: | 5.77 % |
| T-Mobile Sector C Total: | 5.77 % |
| | |
| Site Total: | 13.96 % |

# T-Mobile Maximum MPE Power Values (Per Sector)

| T-Mobile _Frequency Band / Technology (Per Sector) | # Channels | Watts ERP (Per Channel) | Height (feet) | Total Power Density ($\mu W/cm^2$) | Frequency (MHz) | Allowable MPE ($\mu W/cm^2$) | Calculated % MPE |
|---|---|---|---|---|---|---|---|
| T-Mobile PCS - 1900 MHz LTE | 2 | 1,556.18 | 105 | 11.42 | PCS - 1900 MHz | 1000.00 | 1.14% |
| T-Mobile AWS - 2100 MHz LTE | 2 | 2,334.27 | 105 | 17.12 | AWS - 2100 MHz | 1000.00 | 1.71% |
| T-Mobile PCS - 1900 MHz GSM | 1 | 583.57 | 105 | 2.14 | PCS - 1900 MHz | 1000.00 | 0.21% |
| T-Mobile AWS - 2100 MHz UMTS | 1 | 1,556.18 | 105 | 5.71 | AWS - 2100 MHz | 1000.00 | 0.57% |
| T-Mobile 600 MHz LTE | 2 | 788.97 | 105 | 5.79 | 600 MHz | 400.00 | 1.45% |
| T-Mobile 700 MHz LTE | 2 | 432.54 | 105 | 3.17 | 700 MHz | 467.00 | 0.68% |
| | | | | | | **Total*:** | **5.77%** |

*NOTE: Totals may vary by 0.01% due to summing of remainders

## Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

| T-Mobile Sector | Power Density Value (%) |
|---|---|
| Sector A: | 5.77 % |
| Sector B: | 5.77 % |
| Sector C: | 5.77 % |
| T-Mobile Maximum MPE % (Per Sector): | 5.77 % |
| | |
| Site Total: | 13.96 % |
| | |
| Site Compliance Status: | **COMPLIANT** |

The anticipated composite MPE value for this site assuming all carriers present is **13.96%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

Tower Engineering Solutions
Phone (972) 483-0607, Fax (972) 975-9615
1320 Greenway Drive, Suite 600, Irving, Texas 75038

# Structural Analysis Report

**Existing 105 ft PIROD Monopole**

**Customer Name: SBA Communications Corp**

**Customer Site Number: CT01498-S**

**Customer Site Name: Avon**

**Carrier Name: T-Mobile**

**Carrier Site ID / Name: CT11380C / SBA AVON/RT 177**

**Site Location: 10 Redwood Lane**

**Avon, Connecticut**

**Hartford County**

**Latitude: 41.772499**

**Longitude: -72.879999**


10/24/18

**Analysis Result:**

**Max Structural Usage: 61.1% [Pass]**

**Max Foundation Usage: 41% [Pass]**

**Additional Usage Caused by Mount Modification: 2%**

**Report Prepared By: Mariana Franco**

## Introduction

The purpose of this report is to summarize the analysis results on the 105 ft PIROD Monopole to support the proposed antennas and transmission lines in addition to those currently installed. Any modification listed under Sources of Information was assumed completed and was included in this analysis.

## Sources of Information

| | |
|---|---|
| **Tower Drawings** | Pirod, Inc., Eng. File #A-117586 dated September 26, 2000 |
| **Foundation Drawing** | Pirod, Inc., Eng. File #A-117586 dated September 26, 2000 |
| **Geotechnical Report** | Jaworski Geotech, Inc., Project #00301G dated August 31, 2000 |
| **Modification Drawings** | N/A |

## Analysis Criteria

The rigorous analysis was performed in accordance with the requirements and stipulations of the ANSI/TIA/EIA 222-G**.** In accordance with this standard, the structure was analyzed using **TESPoles,** a proprietary analysis software. The program considers the structure as an elastic 3-D model with second-order effects and temperature effects incorporated in the analysis. The analysis was performed using multiple wind directions.

| | |
|---|---|
| **Wind Speed Used in the Analysis:** | Ultimate Design Wind Speed $V_{ult}$ = 120.0 mph (3-Sec. Gust)/ Nominal Design Wind Speed $V_{asd}$ = 93.0 mph (3-Sec. Gust) |
| **Wind Speed with Ice:** | 50 mph (3-Sec. Gust) with 1" radial ice concurrent |
| **Operational Wind Speed:** | 60 mph + 0" Radial ice |
| **Standard/Codes:** | ANSI/TIA/EIA 222-G / 2015 IBC / 2018 Connecticut State Building Code |
| **Exposure Category:** | B |
| **Structure Class:** | II |
| **Topographic Category:** | 1 |
| **Crest Height:** | 0 ft |
| **Seismic Parameters:** | $S_S$ = 0.182g, $S_1$ = 0.064g |

This structural analysis is based upon the tower being classified as a Structure Class II; however, if a different classification is required subsequent to the date hereof, the tower classification will be changed to meet such requirement and a new structural analysis will be run.

## Existing Antennas, Mounts and Transmission Lines

The table below summarizes the antennas, mounts and transmission lines that were considered in the analysis as existing on the tower.

| Items | Elevation (ft) | Qty. | Antenna Descriptions | Mount Type & Qty. | Transmission Lines | Owner |
|---|---|---|---|---|---|---|
| 1 | 116.0 | 1 | 20' Omni | Low Profile Platform | (1) 7/8" | Farmington Woods |
| - | 110.0 | 3 | Ericsson AIR B2A B4P - Panel | Low Profile Platform | (12) 1 5/8" (1) 1 5/8" Fiber | T-Mobile |
| - | | 3 | Ericsson AIR B4A B2P - Panel | | | |
| - | | 3 | Ericsson S11B12 – RRU | | | |
| - | | 3 | Ericsson KRY 112 144 - TMA | | | |
| - | | 3 | Commscope LNX-6515DS - Panel | | | |
| 7 | 98.0 | 1 | Raycap DC2-48-60-18-8F – Surge Arrestor | (3) Standoffs | (12) 1 5/8" (1) 10 mm Fiber (1) 3" (2) DC Power | AT&T |
| 8 | | 6 | Ericsson RRUS-11 - RRU | | | |
| 9 | 97.0 | 6 | Kathrein 782-10250 - Diplexers | Low Profile Platform | | |
| 10 | | 3 | Kathrein Scala - 800-10121 - Panel | | | |
| 11 | | 6 | Kathrein 860-10035 – RET | | | |
| 12 | | 9 | KMW - AM-X-CD-16-65-00T-RET - Panel | | | |
| 13 | | 6 | Powerwave LGP21401 - TMA | | | |
| 14 | 91.0 | 3 | Horizon DUO Radios | Low Profile Platform | (3) 1/2" (6) 5/16" | Clearwire |
| 15 | | 3 | Samsung RRU Radios | | | |
| 16 | | 3 | Andrew Microwaves - VHLP2.5 - Dish | | | |
| 17 | 87.0 | 3 | Alcatel Lucent 800MHz Filter | | (4) 1-1/4" Hybrid | Sprint |
| 18 | | 4 | RFS ACU-A20-N – RET | | | |
| 19 | | 3 | RFS APXVSPP18-C-A20 - Panel | | | |
| 20 | | 3 | RFS APXVTM14-C-120 - Panel | | | |
| 21 | | 3 | Alcatel Lucent 1900 MHz – RRH | | | |
| 22 | | 3 | Alcatel Lucent 800 MHz – RRH | | | |
| 23 | | 3 | Alcatel Lucent TD-RRH8x20-25 - RRH | | | |
| 24 | 75.0 | 1 | GPS | (1) Standoff | (1) ½"* | |

*Lines installed outside of tower.

## Proposed Carrier's Final Configuration of Antennas, Mounts and Transmission Lines

Information pertaining to the proposed carrier's final configuration of antennas and transmission lines was provided by SBA Communications Corp. The proposed antennas and lines are listed below.

| Items | Elevation (ft) | Qty. | Antenna Descriptions | Mount Type & Qty. | Transmission Lines | Owner |
|---|---|---|---|---|---|---|
| 2 | 105.0 | 3 | Ericsson AIR 21 B2A/B4P - Panel | Low Profile Platform, with (1) Perfect 10 Kicker kit (PV-PKBK) and (1) Collar mount (PV-RM3060) and Inner bracing members | (11) 1 5/8" (2) 1 1/4" Hybrid | T-Mobile |
| 3 | | 3 | Ericsson KRY 112 144/2 | | | |
| 4 | | 3 | Ericsson AIR32 KRD901146-1_B66A (Octa) - Panel | | | |
| 5 | | 3 | RFS APXVAARR24_43-U-NA20 (Octa) - Panel | | | |
| 6 | | 3 | Ericsson Radio 4449 B71 + B12 | | | |

All transmission lines are considered running inside of the pole shafts.

## Analysis Results

The results of the structural analysis, performed for the wind and ice loading and antenna equipment as defined above, are summarized as the following:

| | Pole shafts | Anchor Bolts | Base Plate |
|---|---|---|---|
| Max. Usage: | **46.1%** | **36.7%** | **61.1%** |
| Pass/Fail | **Pass** | **Pass** | **Pass** |

## Foundations

| | Moment (Kip-Ft) | Shear (Kips) | Axial (Kips) |
|---|---|---|---|
| Analysis Reactions | 1586.2 | 19.5 | 65.3 |

The foundation has been investigated using the supplied documents and soils report and was found adequate. Therefore, no modification to the foundation will be required.

## Operational Condition (Rigidity):

Operational characteristics of the tower are found to be within the limits prescribed by ANSI/TIA/EIA 222-G for the installed antennas. The maximum twist/sway at the elevation of the proposed equipment is 0.2565 degrees under the operational wind speed as specified in the Analysis Criteria.

## Conclusions

Based on the analysis results, the existing structure and its foundation were found to be adequate to safely support the existing and proposed equipment and meet the minimum requirements per the ANSI/TIA/EIA 222-G Standard under the design basic wind speed as specified in the Analysis Criteria.

# Standard Conditions

1. This analysis was performed based on the information supplied to **(TES) Tower Engineering Solutions, LLC.** Verification of the information provided was not included in the Scope of Work for **TES**. The accuracy of the analysis is dependent on the accuracy of the information provided.

2. The analysis is based on the presumption that the tower members and components along with any existing reinforcement items have been correctly and properly designed, manufactured, installed and maintained.

3. All the existing structural members were assumed to be in good condition with no physical damage or deterioration associated with corrosion.

4. An initial tension of 10% of the break strength on all the existing guy wires was assumed in all the structural analyses of guyed towers unless different values were provided by the client. **TES** cannot take responsibility for the deviations in the analysis results because of differences in the initial tension forces of the existing guy wires.

5. Secondary component or connection secondary components, welds and bolts are assumed to be able to carry their intended original design loads. **TES** cannot take responsibility for verification of the adequacy on the connections, bolts and welds present in the structure.

6. The analyses will be performed based on the codes as specified by the client or based on the best knowledge of the engineering staff of **TES**. In the absence of information to the contrary, all work will be performed in accordance with the latest relevant revision of ANSI/TIA-222. If wind speed and/or ice loads are different from the minimum values recommended by the EIA/TIA-222 standard or other codes, **TES** should be notified in writing and the applicable minimum values provided by the client.

7. The configuration of the existing mounts, antennas, coax and other appurtenances were supplied by the customer for the current structural analysis. **TES** has not visited the tower site to verify the adequacy of the information provided. If there is any discrepancy found in the report regarding the existing conditions, **TES** should be notified immediately to evaluate the effect of the discrepancy on the analysis results.

8. The client will assume responsibility for rework associated with the differences in initially provided information, including tower and foundation information, existing and/or proposed equipment and transmission lines.

9. If a feasibility analysis was performed, final acceptance of changed conditions shall be based upon a rigorous structural analysis.

# Usage Diagram - Max Ratio 46.15% at 0.0ft

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Gh:** | 1.1 | | |
| **Base Elev:** | 0.000 (ft) | | | Page: 1 | |

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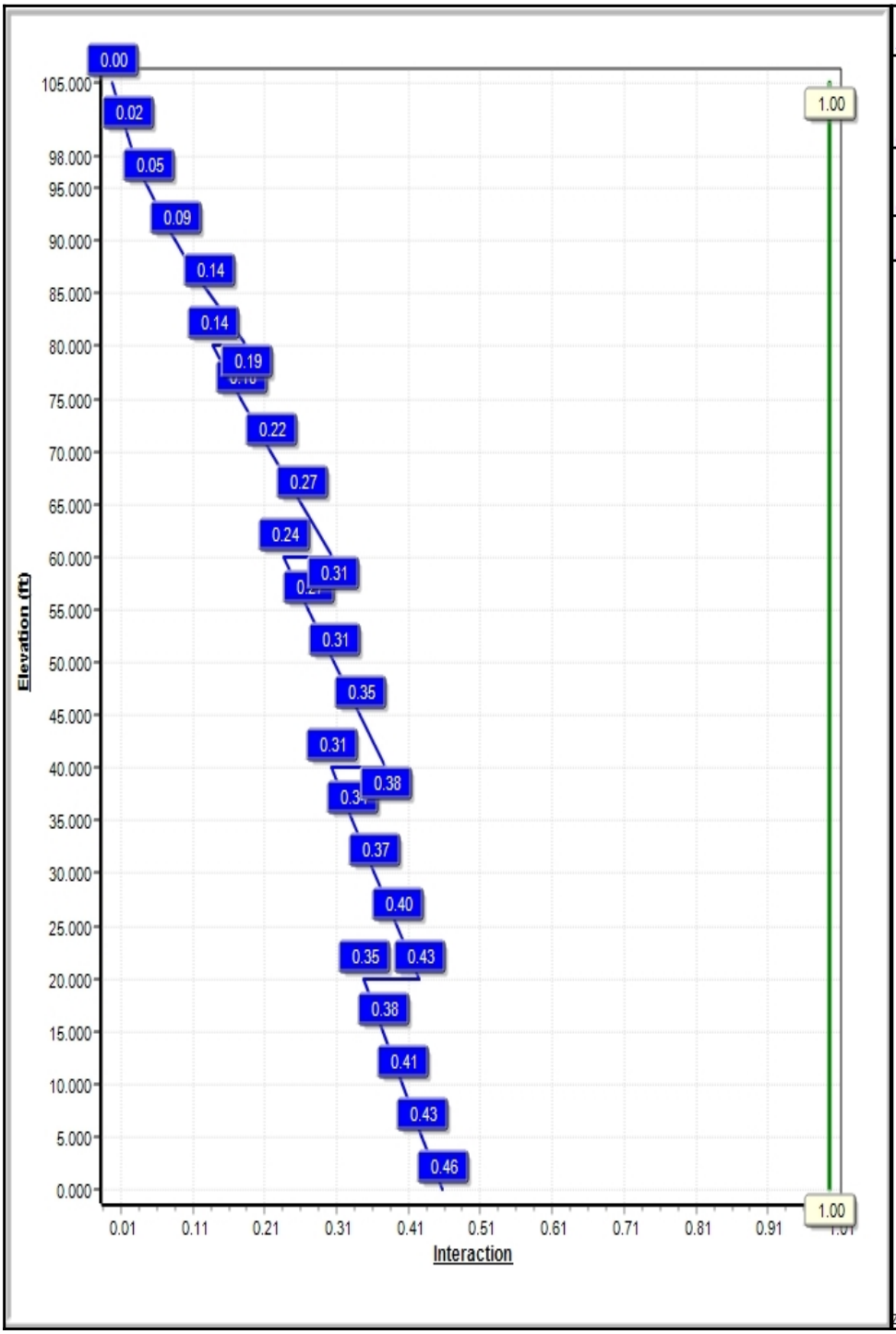
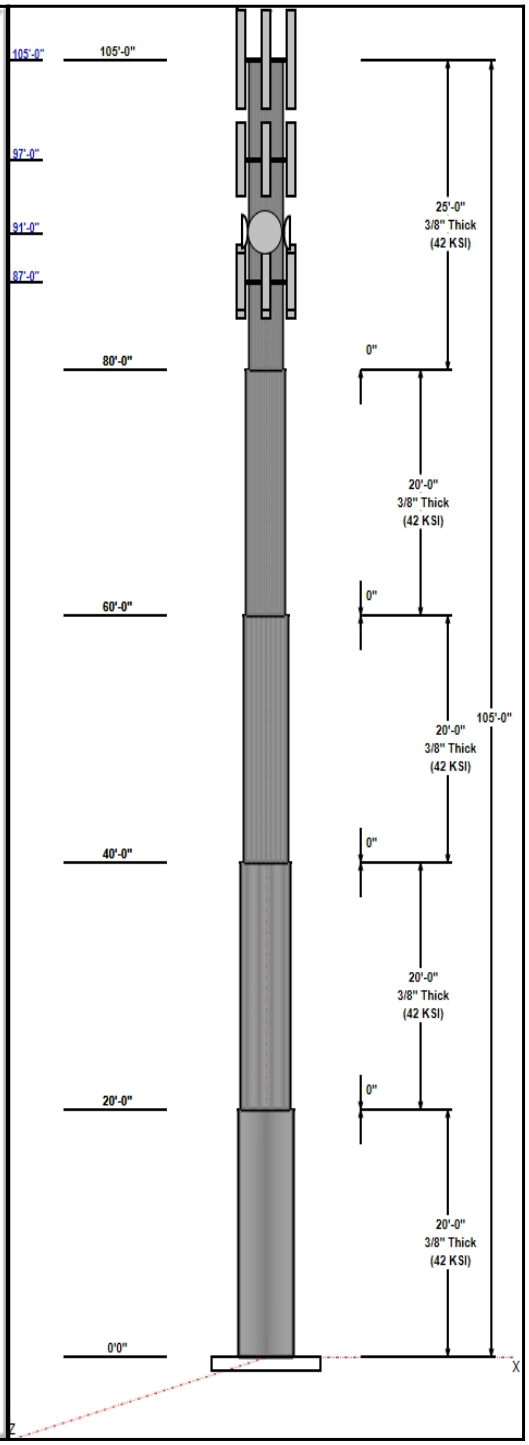
| | | | |
|---|---|---|---|
| Dead Load Factor: | 1.20 | **Iterations:** | 16 |
| Wind Load Factor: | 1.60 | | |

**Load Case : 1.2D + 1.6W 93 mph Wind**





# Structure: CT01498-S-SBA

**Type:** Stepped
**Site Name:** Avon
**Height:** 105.00 (ft)
**Base Elev:** 0.00 (ft)

**Base Shape:** Round
**Taper:** 0.00000

10/24/2018



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## Shaft Properties

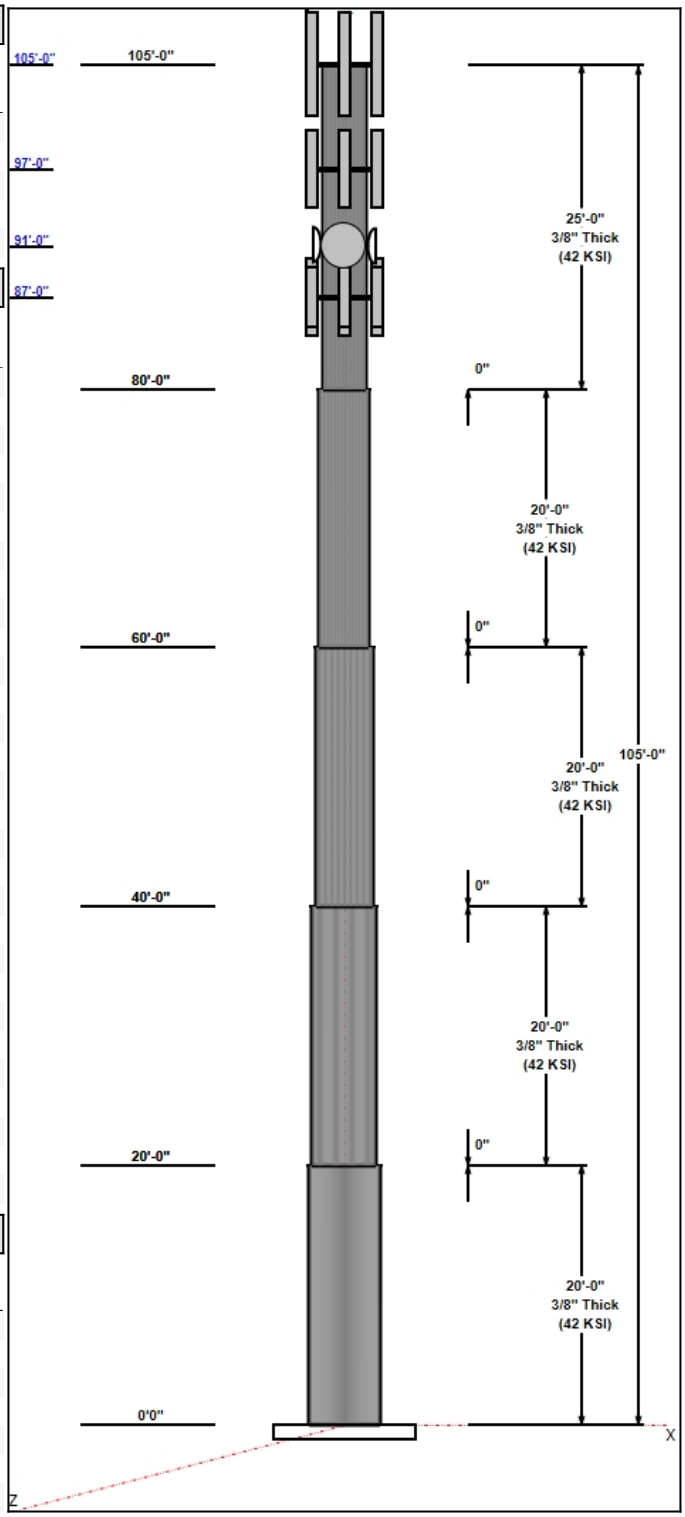
| Seq | Length (ft) | Top (in) | Bottom (in) | Thick (in) | Joint Type | Taper | Grade (ksi) |
|---|---|---|---|---|---|---|---|
| 1 | 20.00 | 60.00 | 60.00 | 0.375 | | 0.00000 | 42 |
| 2 | 20.00 | 54.00 | 54.00 | 0.375 | | 0.00000 | 42 |
| 3 | 20.00 | 48.00 | 48.00 | 0.375 | | 0.00000 | 42 |
| 4 | 20.00 | 42.00 | 42.00 | 0.375 | | 0.00000 | 42 |
| 5 | 25.00 | 36.00 | 36.00 | 0.375 | | 0.00000 | 42 |

## Discrete Appurtenances

| Attach Elev (ft) | Force Elev (ft) | Qty | Description | Carrier |
|---|---|---|---|---|
| 105.00 | 105.00 | 3 | AIR32 | T-Mobile |
| 105.00 | 105.00 | 3 | APXVAARR24_43-U-NA20 | T-Mobile |
| 105.00 | 105.00 | 3 | Ericsson Radio 4449 B71 | T-Mobile |
| 105.00 | 116.00 | 1 | 20' Omni | Farmington Woods |
| 105.00 | 105.00 | 3 | AIR 21 B2A/B4P | T-Mobile |
| 105.00 | 105.00 | 3 | KRY KRY 112 144/2 TMA | T-Mobile |
| 105.00 | 105.00 | 1 | Low Profile | T-Mobile |
| 98.00 | 98.00 | 6 | RRUS-11 | AT&T |
| 98.00 | 98.00 | 1 | Flush Mount | AT&T |
| 98.00 | 98.00 | 1 | DC2-48-60-8-18F-02 | AT&T |
| 97.00 | 97.00 | 9 | AM-X-CD-16-65-00T-RET | AT&T |
| 97.00 | 97.00 | 3 | 800-10121 | AT&T |
| 97.00 | 97.00 | 6 | LGP21401 | AT&T |
| 97.00 | 97.00 | 6 | 860 10035 | AT&T |
| 97.00 | 97.00 | 6 | 782 10250 | AT&T |
| 97.00 | 97.00 | 1 | Low Profile | AT&T |
| 91.00 | 91.00 | 3 | RRU | Clearwire |
| 91.00 | 91.00 | 3 | VHLP2.5 | Clearwire |
| 91.00 | 91.00 | 3 | Horizon DUO Radios | Clearwire |
| 87.00 | 87.00 | 3 | APXVSPP18-C-A20 | Sprint |
| 87.00 | 87.00 | 3 | APXVTM14-C-120 | Sprint |
| 87.00 | 87.00 | 3 | 800MHz Filter | Sprint |
| 87.00 | 87.00 | 3 | TD-RRH8x20-25 | Sprint |
| 87.00 | 87.00 | 4 | ACU-A20-N | Sprint |
| 87.00 | 87.00 | 3 | RRUS-11 1900 MHz | Sprint |
| 87.00 | 87.00 | 3 | RRUS-11 800 MHz | Sprint |
| 87.00 | 87.00 | 1 | Low Profile | Sprint |
| 75.00 | 75.00 | 1 | Standoff Mount | |
| 75.00 | 75.00 | 1 | GPS | |

## Linear Appurtenances

| Elev From (ft) | Elev To (ft) | Placement | Description | Carrier |
|---|---|---|---|---|
| 0.00 | 105.00 | Inside | 1 1/4" Hybrid | T-Mobile |
| 0.00 | 105.00 | Inside | 1 5/8" Coax | T-Mobile |
| 0.00 | 105.00 | Inside | 7/8" Coax | Farmington Woods |
| 0.00 | 105.00 | Outside | Step bolts (ladder) | |
| 0.00 | 97.00 | Inside | 1 5/8" Coax | AT&T |
| 0.00 | 97.00 | Inside | 10 mm Fiber | AT&T |
| 0.00 | 97.00 | Inside | 3" Coax | AT&T |
| 0.00 | 97.00 | Inside | 3/4" DC | AT&T |
| 0.00 | 91.00 | Inside | 1/2" Coax | Clearwire |
| 0.00 | 91.00 | Inside | 5/16" Coax | Clearwire |
| 0.00 | 87.00 | Inside | 1-1/4" Hybrid | Sprint |
| 0.00 | 75.00 | Outside | 1/2" Coax | Sprint |



### Anchor Bolts

| Qty | Specifications | Grade (ksi) | Arrangement |
|---|---|---|---|
| 48 | 1.00" A687 | 105.0 | Radial |

### Base Plate

| Thickness (in) | Specifications (in) | Grade (ksi) | Geometry |
|---|---|---|---|
| 1.2500 | 66.1 | 36.0 | Round |

### Reactions

| Load Case | Moment (FT-Kips) | Shear (Kips) | Axial (Kips) |
|---|---|---|---|
| 1.2D + 1.6W 93 mph Wind | 1586.2 | 19.5 | 38.0 |
| 0.9D + 1.6W 93 mph Wind | 1581.3 | 19.5 | 28.5 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | 502.3 | 6.4 | 65.3 |
| 1.2D + 1.0E | 198.7 | 2.2 | 38.0 |
| 0.9D + 1.0E | 198.1 | 2.2 | 28.5 |
| 1.0D + 1.0W 60 mph Wind | 411.8 | 5.1 | 31.7 |

# Structure: CT01498-S-SBA - Coax Line Placement

**Type:** Monopole
**Site Name:** Avon
**Height:** 105.00 (ft)

10/24/2018



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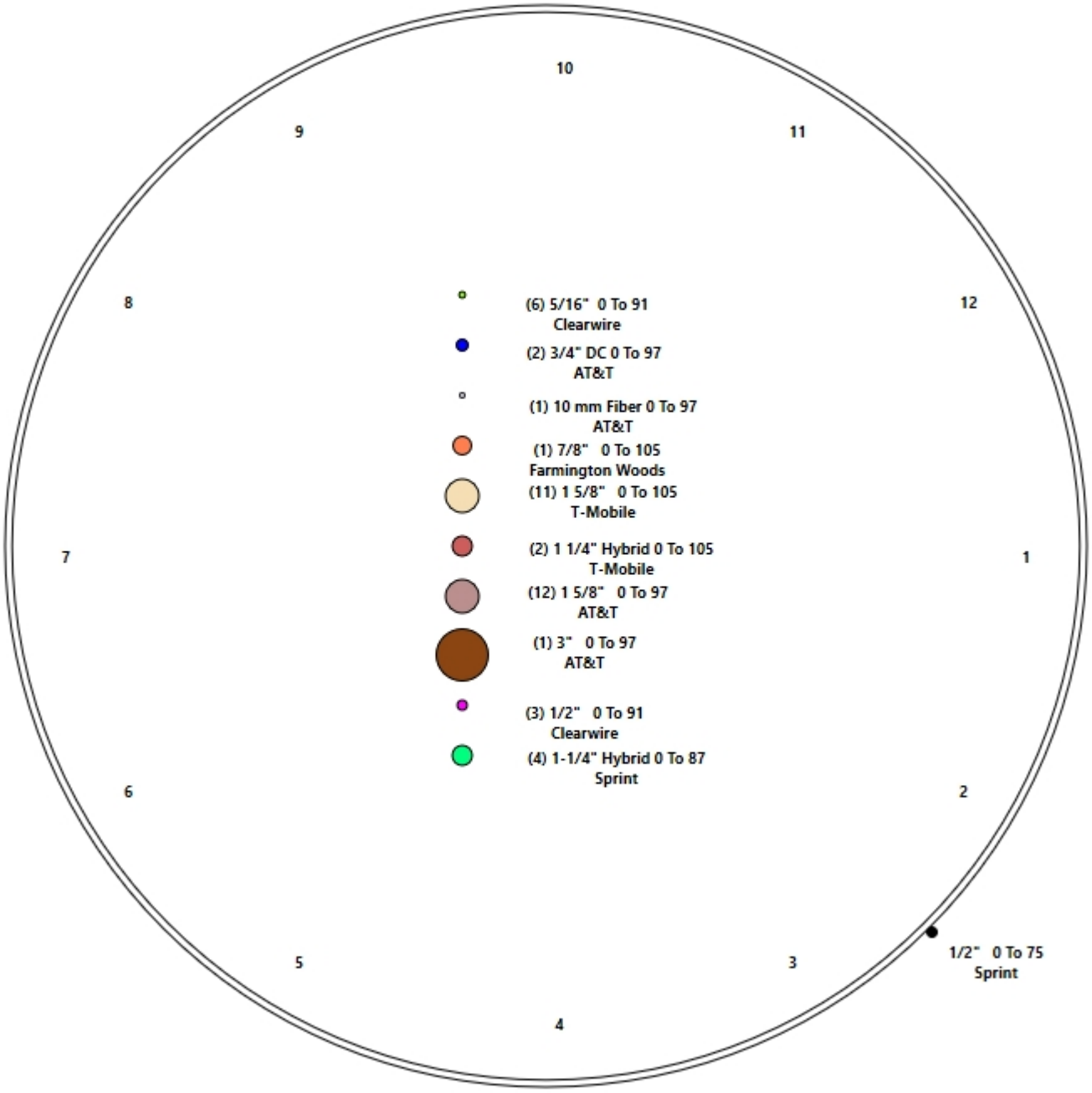

# Shaft Properties

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | | **Code:** | EIA/TIA-222-G | 10/24/2018 |
| **Site Name:** | Avon | | **Exposure:** | B | |
| **Height:** | 105.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 5 |

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| Sec. No. | Shape | Length (ft) | Thick (in) | Fy (ksi) | Joint Type | Overlap (in) | Weight (lb) |
|---|---|---|---|---|---|---|---|
| 1 | R | 20.000 | 0.3750 | 42 | | 0.00 | 4,780 |
| 2 | R | 20.000 | 0.3750 | 42 | | 0.00 | 4,299 |
| 3 | R | 20.000 | 0.3750 | 42 | | 0.00 | 3,818 |
| 4 | R | 20.000 | 0.3750 | 42 | | 0.00 | 3,337 |
| 5 | R | 25.000 | 0.3750 | 42 | | 0.00 | 3,570 |
| | | | | | **Total Shaft Weight:** | | **19,806** |

| | Bottom | | | | | | Top | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sec. No.** | **Dia (in)** | **Elev (ft)** | **Area (sqin)** | **Ix (in^4)** | **W/t Ratio** | **D/t Ratio** | **Dia (in)** | **Elev (ft)** | **Area (sqin)** | **Ix (in^4)** | **W/t Ratio** | **D/t Ratio** | **Taper** |
| 1 | 60.00 | 0.00 | 70.24 | 31239.85 | 0.00 | 160.00 | 60.00 | 20.00 | 70.24 | 31239.8 | 0.00 | 160.0 | 0.000000 |
| 2 | 54.00 | 20.00 | 63.18 | 22726.14 | 0.00 | 144.00 | 54.00 | 40.00 | 63.18 | 22726.1 | 0.00 | 144.0 | 0.000000 |
| 3 | 48.00 | 40.00 | 56.11 | 15919.48 | 0.00 | 128.00 | 48.00 | 60.00 | 56.11 | 15919.4 | 0.00 | 128.0 | 0.000000 |
| 4 | 42.00 | 60.00 | 49.04 | 10628.86 | 0.00 | 112.00 | 42.00 | 80.00 | 49.04 | 10628.8 | 0.00 | 112.0 | 0.000000 |
| 5 | 36.00 | 80.00 | 41.97 | 6663.29 | 0.00 | 96.00 | 36.00 | 105.00 | 41.97 | 6663.29 | 0.00 | 96.00 | 0.000000 |

# Load Summary

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 6 | |

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## Discrete Appurtenances

| | | | | No Ice | | | Ice | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Elev (ft) | Description | Qty | Weight (lb) | CaAa (sf) | CaAa Factor | Weight (lb) | CaAa (sf) | CaAa Factor | Hor. Ecc. (ft) | Vert Ecc (ft) |
| 1 | 105.00 | AIR32 KRD901146-1_B66A (Octa) | 3 | 132.20 | 6.51 | 0.87 | 382.02 | 8.040 | 0.87 | 0.00 | 0.00 |
| 2 | 105.00 | APXVAARR24_43-U-NA20 (Octa) | 3 | 128.00 | 20.24 | 0.70 | 685.47 | 22.711 | 0.70 | 0.00 | 0.00 |
| 3 | 105.00 | Ericsson Radio 4449 B71 + B12 | 3 | 70.00 | 1.65 | 0.67 | 164.43 | 2.364 | 0.67 | 0.00 | 0.00 |
| 4 | 105.00 | 20' Omni | 1 | 55.00 | 6.00 | 1.00 | 248.84 | 15.129 | 1.00 | 0.00 | 11.00 |
| 5 | 105.00 | AIR 21 B2A/B4P | 3 | 90.40 | 6.09 | 0.86 | 319.92 | 7.529 | 0.86 | 0.00 | 0.00 |
| 6 | 105.00 | KRY KRY 112 144/2 TMA | 3 | 11.00 | 0.41 | 0.67 | 24.87 | 1.021 | 0.67 | 0.00 | 0.00 |
| 7 | 105.00 | Low Profile Platform-Round | 1 | 1500.00 | 40.00 | 1.00 | 3184.06 | 81.316 | 1.00 | 0.00 | 0.00 |
| 8 | 98.00 | RRUS-11 | 6 | 44.00 | 2.94 | 0.70 | 130.15 | 4.492 | 0.70 | 0.00 | 0.00 |
| 9 | 98.00 | Flush Mount | 1 | 350.00 | 5.00 | 1.00 | 724.64 | 9.460 | 1.00 | 0.00 | 0.00 |
| 10 | 98.00 | DC2-48-60-8-18F-02 | 1 | 14.50 | 2.92 | 0.66 | 95.30 | 4.472 | 0.66 | 0.00 | 0.00 |
| 11 | 97.00 | AM-X-CD-16-65-00T-RET | 9 | 48.50 | 8.02 | 0.75 | 255.64 | 11.586 | 0.75 | 0.00 | 0.00 |
| 12 | 97.00 | 800-10121 | 3 | 44.10 | 5.15 | 0.79 | 190.72 | 7.839 | 0.79 | 0.00 | 0.00 |
| 13 | 97.00 | LGP21401 | 6 | 14.10 | 1.29 | 0.67 | 46.01 | 2.357 | 0.67 | 0.00 | 0.00 |
| 14 | 97.00 | 860 10035 | 6 | 1.20 | 0.18 | 0.92 | 8.85 | 0.664 | 0.92 | 0.00 | 0.00 |
| 15 | 97.00 | 782 10250 | 6 | 6.40 | 0.52 | 0.76 | 22.72 | 1.246 | 0.76 | 0.00 | 0.00 |
| 16 | 97.00 | Low Profile Platform-Round | 1 | 1500.00 | 22.00 | 1.00 | 3170.77 | 44.544 | 1.00 | 0.00 | 0.00 |
| 17 | 91.00 | RRU | 3 | 42.00 | 1.92 | 0.88 | 111.54 | 3.202 | 0.88 | 0.00 | 0.00 |
| 18 | 91.00 | VHLP2.5 | 3 | 47.60 | 8.43 | 1.00 | 266.63 | 10.595 | 1.00 | 0.00 | 0.00 |
| 19 | 91.00 | Horizon DUO Radios | 3 | 11.50 | 0.84 | 0.76 | 40.08 | 1.683 | 0.76 | 0.00 | 0.00 |
| 20 | 87.00 | APXVSPP18-C-A20 | 3 | 57.00 | 8.02 | 0.83 | 275.25 | 11.547 | 0.83 | 0.00 | 0.00 |
| 21 | 87.00 | APXVTM14-C-120 | 3 | 56.00 | 6.34 | 0.79 | 269.42 | 7.769 | 0.79 | 0.00 | 0.00 |
| 22 | 87.00 | 800MHz Filter | 3 | 10.00 | 0.49 | 0.70 | 30.26 | 1.198 | 0.70 | 0.00 | 0.00 |
| 23 | 87.00 | TD-RRH8x20-25 | 3 | 70.00 | 4.05 | 0.69 | 217.24 | 5.098 | 0.69 | 0.00 | 0.00 |
| 24 | 87.00 | ACU-A20-N | 4 | 1.00 | 0.14 | 0.79 | 6.42 | 0.515 | 0.79 | 0.00 | 0.00 |
| 25 | 87.00 | RRUS-11 1900 MHz | 3 | 44.00 | 2.94 | 0.70 | 129.13 | 4.474 | 0.70 | 0.00 | 0.00 |
| 26 | 87.00 | RRUS-11 800 MHz | 3 | 54.00 | 2.94 | 0.75 | 149.39 | 4.474 | 0.75 | 0.00 | 0.00 |
| 27 | 87.00 | Low Profile Platform-Round | 1 | 1500.00 | 22.00 | 1.00 | 3152.69 | 44.300 | 1.00 | 0.00 | 0.00 |
| 28 | 75.00 | Standoff Mount | 1 | 20.00 | 2.00 | 1.00 | 40.84 | 3.737 | 1.00 | 0.00 | 0.00 |
| 29 | 75.00 | GPS | 1 | 10.00 | 1.00 | 1.00 | 46.47 | 1.886 | 1.00 | 0.00 | 0.00 |
| | | **Totals:** | **90** | **8,387.60** | | | **24,005.63** | | | | |

## Linear Appurtenances

| Bottom Elev. (ft) | Top Elev. (ft) | Description | Exposed Width | Exposed |
|---|---|---|---|---|
| 0.00 | 105.00 | (2) 1 1/4" Hybrid | 0.00 | Inside |
| 0.00 | 105.00 | (11) 1 5/8" Coax | 0.00 | Inside |
| 0.00 | 105.00 | (1) 7/8" Coax | 0.00 | Inside |
| 0.00 | 105.00 | (1) Step bolts (ladder) | 0.63 | Outside |
| 0.00 | 97.00 | (12) 1 5/8" Coax | 0.00 | Inside |
| 0.00 | 97.00 | (1) 10 mm Fiber | 0.00 | Inside |
| 0.00 | 97.00 | (1) 3" Coax | 0.00 | Inside |
| 0.00 | 97.00 | (2) 3/4" DC | 0.00 | Inside |
| 0.00 | 91.00 | (3) 1/2" Coax | 0.00 | Inside |
| 0.00 | 91.00 | (6) 5/16" Coax | 0.00 | Inside |
| 0.00 | 87.00 | (4) 1-1/4" Hybrid | 0.00 | Inside |
| 0.00 | 75.00 | (1) 1/2" Coax | 0.65 | Outside |

## Discrete Appurtenances

| No. | Elev (ft) | Description | Qty | No Ice Weight (lb) | No Ice CaAa (sf) | No Ice CaAa Factor | Ice Weight (lb) | Ice CaAa (sf) | Ice CaAa Factor | Hor. Ecc. (ft) | Vert Ecc (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|

# Shaft Section Properties

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 8 | |

**Increment Length:** **5 (ft)**

| Elev (ft) | Description | Thick (in) | Dia (in) | Area (in^2) | Ix (in^4) | W/t Ratio | D/t Ratio | Fpy (ksi) | S (in^3) | Weight (lb) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 0.3750 | 60.000 | 70.244 | 31239.9 | 0.00 | 160.00 | 34.9 | 1041. | 0.0 |
| 5.00 | | 0.3750 | 60.000 | 70.244 | 31239.9 | 0.00 | 160.00 | 34.9 | 1041. | 1195.1 |
| 10.00 | | 0.3750 | 60.000 | 70.244 | 31239.9 | 0.00 | 160.00 | 34.9 | 1041. | 1195.1 |
| 15.00 | | 0.3750 | 60.000 | 70.244 | 31239.9 | 0.00 | 160.00 | 34.9 | 1041. | 1195.1 |
| 20.00 | Top - Section 1 | 0.3750 | 60.000 | 70.244 | 31239.9 | 0.00 | 160.00 | 34.9 | 1041. | 1195.1 |
| 20.00 | Bot - Section 2 | 0.3750 | 54.000 | 63.175 | 22726.1 | 0.00 | 160.00 | 35.6 | 841.7 | |
| 25.00 | | 0.3750 | 54.000 | 63.175 | 22726.1 | 0.00 | 144.00 | 35.6 | 841.7 | 1074.9 |
| 30.00 | | 0.3750 | 54.000 | 63.175 | 22726.1 | 0.00 | 144.00 | 35.6 | 841.7 | 1074.9 |
| 35.00 | | 0.3750 | 54.000 | 63.175 | 22726.1 | 0.00 | 144.00 | 35.6 | 841.7 | 1074.9 |
| 40.00 | Top - Section 2 | 0.3750 | 54.000 | 63.175 | 22726.1 | 0.00 | 144.00 | 35.6 | 841.7 | 1074.9 |
| 40.00 | Bot - Section 3 | 0.3750 | 48.000 | 56.107 | 15919.5 | 0.00 | 144.00 | 36.6 | 663.3 | |
| 45.00 | | 0.3750 | 48.000 | 56.107 | 15919.5 | 0.00 | 128.00 | 36.6 | 663.3 | 954.6 |
| 50.00 | | 0.3750 | 48.000 | 56.107 | 15919.5 | 0.00 | 128.00 | 36.6 | 663.3 | 954.6 |
| 55.00 | | 0.3750 | 48.000 | 56.107 | 15919.5 | 0.00 | 128.00 | 36.6 | 663.3 | 954.6 |
| 60.00 | Top - Section 3 | 0.3750 | 48.000 | 56.107 | 15919.5 | 0.00 | 128.00 | 36.6 | 663.3 | 954.6 |
| 60.00 | Bot - Section 4 | 0.3750 | 42.000 | 49.038 | 10628.9 | 0.00 | 128.00 | 37.8 | 506.1 | |
| 65.00 | | 0.3750 | 42.000 | 49.038 | 10628.9 | 0.00 | 112.00 | 37.8 | 506.1 | 834.3 |
| 70.00 | | 0.3750 | 42.000 | 49.038 | 10628.9 | 0.00 | 112.00 | 37.8 | 506.1 | 834.3 |
| 75.00 | | 0.3750 | 42.000 | 49.038 | 10628.9 | 0.00 | 112.00 | 37.8 | 506.1 | 834.3 |
| 80.00 | Top - Section 4 | 0.3750 | 42.000 | 49.038 | 10628.9 | 0.00 | 112.00 | 37.8 | 506.1 | 834.3 |
| 80.00 | Bot - Section 5 | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 112.00 | 39.4 | 370.2 | |
| 85.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 714.1 |
| 87.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 285.6 |
| 90.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 428.4 |
| 91.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 142.8 |
| 95.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 571.3 |
| 97.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 285.6 |
| 98.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 142.8 |
| 100.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 285.6 |
| 105.00 | | 0.3750 | 36.000 | 41.970 | 6663.3 | 0.00 | 96.00 | 39.4 | 370.2 | 714.1 |
| | | | | | | | | | | **19806.0** |

# Wind Loading - Shaft

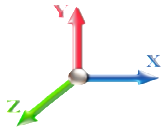
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 9 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 93 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 16

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 388.7 | 0.0 | 1434.1 |
| 10.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 388.7 | 0.0 | 1434.1 |
| 15.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 388.7 | 0.0 | 1434.1 |
| 20.00 | Top - Section 1 | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 388.7 | 0.0 | 1434.1 |
| 25.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 350.14 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 349.8 | 0.0 | 1289.8 |
| 30.00 | | 1.00 | 0.70 | 14.736 | 16.21 | 350.29 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 350.1 | 0.0 | 1289.8 |
| 35.00 | | 1.00 | 0.73 | 15.400 | 16.94 | 358.09 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 365.9 | 0.0 | 1289.8 |
| 40.00 | Top - Section 2 | 1.00 | 0.76 | 15.999 | 17.60 | 364.99 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 380.1 | 0.0 | 1289.8 |
| 45.00 | | 1.00 | 0.79 | 16.546 | 18.20 | 329.94 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 349.5 | 0.0 | 1145.5 |
| 50.00 | | 1.00 | 0.81 | 17.052 | 18.76 | 334.94 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 360.1 | 0.0 | 1145.5 |
| 55.00 | | 1.00 | 0.83 | 17.523 | 19.28 | 339.53 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 370.1 | 0.0 | 1145.5 |
| 60.00 | Top - Section 3 | 1.00 | 0.85 | 17.964 | 19.76 | 343.78 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 379.4 | 0.0 | 1145.5 |
| 65.00 | | 1.00 | 0.87 | 18.380 | 20.22 | 304.27 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 339.7 | 0.0 | 1001.2 |
| 70.00 | | 1.00 | 0.89 | 18.773 | 20.65 | 307.50 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 346.9 | 0.0 | 1001.2 |
| 75.00 | Appurtenance(s) | 1.00 | 0.91 | 19.147 | 21.06 | 310.55 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 353.8 | 0.0 | 1001.2 |
| 80.00 | Top - Section 4 | 1.00 | 0.93 | 19.503 | 21.45 | 313.43 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 360.4 | 0.0 | 1001.2 |
| 85.00 | | 1.00 | 0.94 | 19.844 | 21.83 | 270.99 | 0.600 | 0.000 | 5.00 | 15.000 | 9.00 | 314.3 | 0.0 | 856.9 |
| 87.00 | Appurtenance(s) | 1.00 | 0.95 | 19.976 | 21.97 | 271.89 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 126.6 | 0.0 | 342.8 |
| 90.00 | | 1.00 | 0.96 | 20.170 | 22.19 | 273.21 | 0.600 | 0.000 | 3.00 | 9.000 | 5.40 | 191.7 | 0.0 | 514.1 |
| 91.00 | Appurtenance(s) | 1.00 | 0.96 | 20.234 | 22.26 | 273.64 | 0.600 | 0.000 | 1.00 | 3.000 | 1.80 | 64.1 | 0.0 | 171.4 |
| 95.00 | | 1.00 | 0.97 | 20.484 | 22.53 | 275.33 | 0.600 | 0.000 | 4.00 | 12.000 | 7.20 | 259.6 | 0.0 | 685.5 |
| 97.00 | Appurtenance(s) | 1.00 | 0.98 | 20.607 | 22.67 | 276.15 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 130.6 | 0.0 | 342.8 |
| 98.00 | Appurtenance(s) | 1.00 | 0.98 | 20.667 | 22.73 | 276.55 | 0.600 | 0.000 | 1.00 | 3.000 | 1.80 | 65.5 | 0.0 | 171.4 |
| 100.00 | | 1.00 | 0.99 | 20.787 | 22.87 | 277.35 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 131.7 | 0.0 | 342.8 |
| 105.00 | Appurtenance(s) | 1.00 | 1.00 | 21.079 | 23.19 | 279.29 | 0.600 | 0.000 | 5.00 | 15.000 | 9.00 | 333.9 | 0.0 | 856.9 |
| | | | | | | | | **Totals:** | **105.00** | | | **7,478.7** | | **23,767.2** |

# Discrete Appurtenance Forces

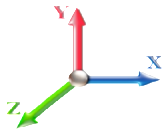
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 10 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 93 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 16

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | CaAa x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 105.00 | KRY KRY 112 144/2 TMA | 3 | 21.079 | 23.186 | 0.67 | 1.00 | 0.82 | 39.60 | 0.000 | 0.000 | 30.57 | 0.00 | 0.00 |
| 2 | 105.00 | 20' Omni | 1 | 21.687 | 23.856 | 1.00 | 1.00 | 6.00 | 66.00 | 0.000 | 11.000 | 229.02 | 0.00 | 2519.19 |
| 3 | 105.00 | AIR 21 B2A/B4P | 3 | 21.079 | 23.186 | 0.86 | 1.00 | 15.71 | 325.44 | 0.000 | 0.000 | 582.90 | 0.00 | 0.00 |
| 4 | 105.00 | Ericsson Radio 4449 B71 | 3 | 21.079 | 23.186 | 0.67 | 1.00 | 3.32 | 252.00 | 0.000 | 0.000 | 123.04 | 0.00 | 0.00 |
| 5 | 105.00 | Low Profile | 1 | 21.079 | 23.186 | 1.00 | 1.00 | 40.00 | 1800.00 | 0.000 | 0.000 | 1483.93 | 0.00 | 0.00 |
| 6 | 105.00 | AIR32 | 3 | 21.079 | 23.186 | 0.87 | 1.00 | 16.99 | 475.92 | 0.000 | 0.000 | 630.34 | 0.00 | 0.00 |
| 7 | 105.00 | APXVAARR24_43-U-NA2 | 3 | 21.079 | 23.186 | 0.70 | 1.00 | 42.50 | 460.80 | 0.000 | 0.000 | 1576.83 | 0.00 | 0.00 |
| 8 | 98.00 | DC2-48-60-8-18F-02 | 1 | 20.667 | 22.734 | 0.66 | 1.00 | 1.93 | 17.40 | 0.000 | 0.000 | 70.10 | 0.00 | 0.00 |
| 9 | 98.00 | RRUS-11 | 6 | 20.667 | 22.734 | 0.70 | 1.00 | 12.35 | 316.80 | 0.000 | 0.000 | 449.15 | 0.00 | 0.00 |
| 10 | 98.00 | Flush Mount | 1 | 20.667 | 22.734 | 1.00 | 1.00 | 5.00 | 420.00 | 0.000 | 0.000 | 181.87 | 0.00 | 0.00 |
| 11 | 97.00 | Low Profile | 1 | 20.607 | 22.667 | 1.00 | 1.00 | 22.00 | 1800.00 | 0.000 | 0.000 | 797.89 | 0.00 | 0.00 |
| 12 | 97.00 | 782 10250 | 6 | 20.607 | 22.667 | 0.61 | 0.80 | 1.90 | 46.08 | 0.000 | 0.000 | 68.80 | 0.00 | 0.00 |
| 13 | 97.00 | 860 10035 | 6 | 20.607 | 22.667 | 0.74 | 0.80 | 0.79 | 8.64 | 0.000 | 0.000 | 28.83 | 0.00 | 0.00 |
| 14 | 97.00 | LGP21401 | 6 | 20.607 | 22.667 | 0.54 | 0.80 | 4.15 | 101.52 | 0.000 | 0.000 | 150.46 | 0.00 | 0.00 |
| 15 | 97.00 | 800-10121 | 3 | 20.607 | 22.667 | 0.63 | 0.80 | 9.76 | 158.76 | 0.000 | 0.000 | 354.13 | 0.00 | 0.00 |
| 16 | 97.00 | AM-X-CD-16-65-00T-RET | 9 | 20.607 | 22.667 | 0.60 | 0.80 | 43.31 | 523.80 | 0.000 | 0.000 | 1570.69 | 0.00 | 0.00 |
| 17 | 91.00 | RRU | 3 | 20.234 | 22.258 | 0.88 | 1.00 | 5.07 | 151.20 | 0.000 | 0.000 | 180.51 | 0.00 | 0.00 |
| 18 | 91.00 | Horizon DUO Radios | 3 | 20.234 | 22.258 | 0.76 | 1.00 | 1.92 | 41.40 | 0.000 | 0.000 | 68.20 | 0.00 | 0.00 |
| 19 | 91.00 | VHLP2.5 | 3 | 20.234 | 22.258 | 1.00 | 1.00 | 25.29 | 171.36 | 0.000 | 0.000 | 900.63 | 0.00 | 0.00 |
| 20 | 87.00 | APXVTM14-C-120 | 3 | 19.976 | 21.974 | 0.63 | 0.80 | 12.02 | 201.60 | 0.000 | 0.000 | 422.62 | 0.00 | 0.00 |
| 21 | 87.00 | RRUS-11 1900 MHz | 3 | 19.976 | 21.974 | 0.56 | 0.80 | 4.94 | 158.40 | 0.000 | 0.000 | 173.65 | 0.00 | 0.00 |
| 22 | 87.00 | RRUS-11 800 MHz | 3 | 19.976 | 21.974 | 0.60 | 0.80 | 5.29 | 194.40 | 0.000 | 0.000 | 186.05 | 0.00 | 0.00 |
| 23 | 87.00 | APXVSPP18-C-A20 | 3 | 19.976 | 21.974 | 0.66 | 0.80 | 15.98 | 205.20 | 0.000 | 0.000 | 561.67 | 0.00 | 0.00 |
| 24 | 87.00 | TD-RRH8x20-25 | 3 | 19.976 | 21.974 | 0.55 | 0.80 | 6.71 | 252.00 | 0.000 | 0.000 | 235.80 | 0.00 | 0.00 |
| 25 | 87.00 | 800MHz Filter | 3 | 19.976 | 21.974 | 0.56 | 0.80 | 0.82 | 36.00 | 0.000 | 0.000 | 28.94 | 0.00 | 0.00 |
| 26 | 87.00 | ACU-A20-N | 4 | 19.976 | 21.974 | 0.63 | 0.80 | 0.35 | 4.80 | 0.000 | 0.000 | 12.44 | 0.00 | 0.00 |
| 27 | 87.00 | Low Profile | 1 | 19.976 | 21.974 | 1.00 | 1.00 | 22.00 | 1800.00 | 0.000 | 0.000 | 773.47 | 0.00 | 0.00 |
| 28 | 75.00 | GPS | 1 | 19.147 | 21.061 | 1.00 | 1.00 | 1.00 | 12.00 | 0.000 | 0.000 | 33.70 | 0.00 | 0.00 |
| 29 | 75.00 | Standoff Mount | 1 | 19.147 | 21.061 | 1.00 | 1.00 | 2.00 | 24.00 | 0.000 | 0.000 | 67.40 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **10,065.12** | | | **11,973.64** | | |

# Total Applied Force Summary

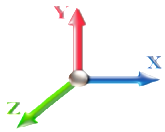
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | | **Code:** | EIA/TIA-222-G | 10/24/2018 |
| **Site Name:** | Avon | | **Exposure:** | B | |
| **Height:** | 105.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 11 |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 93 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 16

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 388.72 | 1645.69 | 0.00 | 0.00 |
| 10.00 | | 388.72 | 1645.69 | 0.00 | 0.00 |
| 15.00 | | 388.72 | 1645.69 | 0.00 | 0.00 |
| 20.00 | | 388.72 | 1645.69 | 0.00 | 0.00 |
| 25.00 | | 349.84 | 1501.37 | 0.00 | 0.00 |
| 30.00 | | 350.14 | 1501.37 | 0.00 | 0.00 |
| 35.00 | | 365.90 | 1501.37 | 0.00 | 0.00 |
| 40.00 | | 380.13 | 1501.37 | 0.00 | 0.00 |
| 45.00 | | 349.46 | 1357.05 | 0.00 | 0.00 |
| 50.00 | | 360.14 | 1357.05 | 0.00 | 0.00 |
| 55.00 | | 370.08 | 1357.05 | 0.00 | 0.00 |
| 60.00 | | 379.40 | 1357.05 | 0.00 | 0.00 |
| 65.00 | | 339.65 | 1212.73 | 0.00 | 0.00 |
| 70.00 | | 346.92 | 1212.73 | 0.00 | 0.00 |
| 75.00 | (2) attachments | 454.92 | 1248.73 | 0.00 | 0.00 |
| 80.00 | | 360.41 | 1211.77 | 0.00 | 0.00 |
| 85.00 | | 314.32 | 1067.46 | 0.00 | 0.00 |
| 87.00 | (23) attachments | 2521.22 | 3279.38 | 0.00 | 0.00 |
| 90.00 | | 191.70 | 626.74 | 0.00 | 0.00 |
| 91.00 | (9) attachments | 1213.45 | 572.87 | 0.00 | 0.00 |
| 95.00 | | 259.58 | 831.04 | 0.00 | 0.00 |
| 97.00 | (31) attachments | 3101.36 | 3054.32 | 0.00 | 0.00 |
| 98.00 | (8) attachments | 766.59 | 943.82 | 0.00 | 0.00 |
| 100.00 | | 131.71 | 379.23 | 0.00 | 0.00 |
| 105.00 | (17) attachments | 4990.51 | 4367.84 | 0.00 | 2519.19 |
| | **Totals:** | **19,452.33** | **38,025.10** | **0.00** | **2,519.19** |

# Linear Appurtenance Segment Forces (Factored)

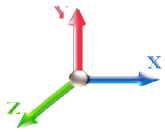
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 12 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 93 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 16

| Top Elev (ft) | Description | Wind Exposed | Length (ft) | Ca | Exposed Width (in) | Area (sqft) | CaAa (sqft) | Ra | Cf Adjust Factor | qz (psf) | F X (lb) | Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 6.24 |
| 5.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 0.96 |
| 10.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 6.24 |
| 10.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 0.96 |
| 15.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 6.24 |
| 15.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 0.96 |
| 20.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 6.24 |
| 20.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 0.96 |
| 25.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 14.724 | 0.00 | 6.24 |
| 25.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 14.724 | 0.00 | 0.96 |
| 30.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 14.736 | 0.00 | 6.24 |
| 30.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 14.736 | 0.00 | 0.96 |
| 35.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 15.400 | 0.00 | 6.24 |
| 35.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 15.400 | 0.00 | 0.96 |
| 40.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 15.999 | 0.00 | 6.24 |
| 40.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 15.999 | 0.00 | 0.96 |
| 45.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 16.546 | 0.00 | 6.24 |
| 45.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 16.546 | 0.00 | 0.96 |
| 50.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 17.052 | 0.00 | 6.24 |
| 50.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 17.052 | 0.00 | 0.96 |
| 55.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 17.523 | 0.00 | 6.24 |
| 55.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 17.523 | 0.00 | 0.96 |
| 60.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 17.964 | 0.00 | 6.24 |
| 60.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 17.964 | 0.00 | 0.96 |
| 65.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 18.380 | 0.00 | 6.24 |
| 65.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 18.380 | 0.00 | 0.96 |
| 70.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 18.773 | 0.00 | 6.24 |
| 70.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 18.773 | 0.00 | 0.96 |
| 75.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 19.147 | 0.00 | 6.24 |
| 75.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 19.147 | 0.00 | 0.96 |
| 80.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.015 | 0.000 | 19.503 | 0.00 | 6.24 |
| 85.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.017 | 0.000 | 19.844 | 0.00 | 6.24 |
| 87.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 19.976 | 0.00 | 2.50 |
| 90.00 | Step bolts (ladder) | Yes | 3.00 | 0.000 | 0.63 | 0.16 | 0.00 | 0.018 | 0.000 | 20.170 | 0.00 | 3.74 |
| 91.00 | Step bolts (ladder) | Yes | 1.00 | 0.000 | 0.63 | 0.05 | 0.00 | 0.018 | 0.000 | 20.234 | 0.00 | 1.25 |
| 95.00 | Step bolts (ladder) | Yes | 4.00 | 0.000 | 0.63 | 0.21 | 0.00 | 0.018 | 0.000 | 20.484 | 0.00 | 4.99 |
| 97.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 20.607 | 0.00 | 2.50 |
| 98.00 | Step bolts (ladder) | Yes | 1.00 | 0.000 | 0.63 | 0.05 | 0.00 | 0.018 | 0.000 | 20.667 | 0.00 | 1.25 |
| 100.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 20.787 | 0.00 | 2.50 |
| 105.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.017 | 0.000 | 21.079 | 0.00 | 6.24 |
| | | | | | | | | | **Totals:** | | **0.0** | **145.4** |

# Calculated Forces

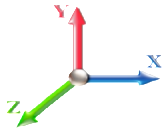
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 13 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.6W 93 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.60




**Iterations** 16

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -38.01 | -19.48 | 0.00 | -1586.1 | 0.00 | 1586.19 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.00 | 0.000 | 0.000 | 0.461 |
| 5.00 | -36.34 | -19.13 | 0.00 | -1488.8 | 0.00 | 1488.81 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.04 | -0.070 | 0.000 | 0.433 |
| 10.00 | -34.68 | -18.78 | 0.00 | -1393.1 | 0.00 | 1393.16 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.15 | -0.136 | 0.000 | 0.406 |
| 15.00 | -33.02 | -18.42 | 0.00 | -1299.2 | 0.00 | 1299.28 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.32 | -0.197 | 0.000 | 0.379 |
| 20.00 | -31.35 | -18.05 | 0.00 | -1207.2 | 0.00 | 1207.20 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.56 | -0.254 | 0.000 | 0.352 |
| 20.00 | -31.35 | -18.05 | 0.00 | -1207.2 | 0.00 | 1207.20 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.56 | -0.254 | 0.000 | 0.430 |
| 25.00 | -29.84 | -17.73 | 0.00 | -1116.9 | 0.00 | 1116.95 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.86 | -0.307 | 0.000 | 0.398 |
| 30.00 | -28.32 | -17.40 | 0.00 | -1028.3 | 0.00 | 1028.32 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 1.21 | -0.374 | 0.000 | 0.367 |
| 35.00 | -26.80 | -17.05 | 0.00 | -941.33 | 0.00 | 941.33 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 1.64 | -0.436 | 0.000 | 0.336 |
| 40.00 | -25.29 | -16.68 | 0.00 | -856.09 | 0.00 | 856.09 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 2.13 | -0.492 | 0.000 | 0.306 |
| 40.00 | -25.29 | -16.68 | 0.00 | -856.09 | 0.00 | 856.09 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 2.13 | -0.492 | 0.000 | 0.383 |
| 45.00 | -23.92 | -16.34 | 0.00 | -772.68 | 0.00 | 772.68 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 2.67 | -0.543 | 0.000 | 0.346 |
| 50.00 | -22.55 | -15.99 | 0.00 | -690.97 | 0.00 | 690.97 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 3.27 | -0.608 | 0.000 | 0.310 |
| 55.00 | -21.18 | -15.63 | 0.00 | -611.00 | 0.00 | 611.00 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 3.94 | -0.666 | 0.000 | 0.275 |
| 60.00 | -19.81 | -15.25 | 0.00 | -532.86 | 0.00 | 532.86 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 4.67 | -0.718 | 0.000 | 0.240 |
| 60.00 | -19.81 | -15.25 | 0.00 | -532.86 | 0.00 | 532.86 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 4.67 | -0.718 | 0.000 | 0.309 |
| 65.00 | -18.59 | -14.91 | 0.00 | -456.61 | 0.00 | 456.61 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 5.45 | -0.762 | 0.000 | 0.265 |
| 70.00 | -17.37 | -14.56 | 0.00 | -382.06 | 0.00 | 382.06 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 6.28 | -0.818 | 0.000 | 0.223 |
| 75.00 | -16.12 | -14.10 | 0.00 | -309.24 | 0.00 | 309.24 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 7.16 | -0.864 | 0.000 | 0.182 |
| 80.00 | -14.91 | -13.73 | 0.00 | -238.74 | 0.00 | 238.74 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 8.08 | -0.901 | 0.000 | 0.142 |
| 80.00 | -14.91 | -13.73 | 0.00 | -238.74 | 0.00 | 238.74 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 8.08 | -0.901 | 0.000 | 0.189 |
| 85.00 | -13.84 | -13.40 | 0.00 | -170.09 | 0.00 | 170.09 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 9.04 | -0.928 | 0.000 | 0.137 |
| 87.00 | -10.60 | -10.83 | 0.00 | -143.28 | 0.00 | 143.28 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 9.44 | -0.942 | 0.000 | 0.114 |
| 90.00 | -9.97 | -10.63 | 0.00 | -110.79 | 0.00 | 110.79 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 10.03 | -0.958 | 0.000 | 0.090 |
| 91.00 | -9.42 | -9.41 | 0.00 | -100.15 | 0.00 | 100.15 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 10.24 | -0.962 | 0.000 | 0.081 |
| 95.00 | -8.59 | -9.14 | 0.00 | -62.51 | 0.00 | 62.51 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 11.05 | -0.976 | 0.000 | 0.053 |
| 97.00 | -5.59 | -5.99 | 0.00 | -44.24 | 0.00 | 44.24 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 11.46 | -0.981 | 0.000 | 0.037 |
| 98.00 | -4.66 | -5.20 | 0.00 | -38.25 | 0.00 | 38.25 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 11.66 | -0.983 | 0.000 | 0.032 |
| 100.00 | -4.28 | -5.07 | 0.00 | -27.84 | 0.00 | 27.84 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 12.08 | -0.985 | 0.000 | 0.024 |
| 105.00 | 0.00 | -4.99 | 0.00 | -2.52 | 0.00 | 2.52 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 13.11 | -0.989 | 0.000 | 0.002 |

# Wind Loading - Shaft

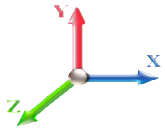
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 14 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 93 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 16

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 388.7 | 0.0 | 1075.6 |
| 10.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 388.7 | 0.0 | 1075.6 |
| 15.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 388.7 | 0.0 | 1075.6 |
| 20.00 | Top - Section 1 | 1.00 | 0.70 | 14.724 | 16.20 | 389.05 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 388.7 | 0.0 | 1075.6 |
| 25.00 | | 1.00 | 0.70 | 14.724 | 16.20 | 350.14 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 349.8 | 0.0 | 967.4 |
| 30.00 | | 1.00 | 0.70 | 14.736 | 16.21 | 350.29 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 350.1 | 0.0 | 967.4 |
| 35.00 | | 1.00 | 0.73 | 15.400 | 16.94 | 358.09 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 365.9 | 0.0 | 967.4 |
| 40.00 | Top - Section 2 | 1.00 | 0.76 | 15.999 | 17.60 | 364.99 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 380.1 | 0.0 | 967.4 |
| 45.00 | | 1.00 | 0.79 | 16.546 | 18.20 | 329.94 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 349.5 | 0.0 | 859.1 |
| 50.00 | | 1.00 | 0.81 | 17.052 | 18.76 | 334.94 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 360.1 | 0.0 | 859.1 |
| 55.00 | | 1.00 | 0.83 | 17.523 | 19.28 | 339.53 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 370.1 | 0.0 | 859.1 |
| 60.00 | Top - Section 3 | 1.00 | 0.85 | 17.964 | 19.76 | 343.78 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 379.4 | 0.0 | 859.1 |
| 65.00 | | 1.00 | 0.87 | 18.380 | 20.22 | 304.27 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 339.7 | 0.0 | 750.9 |
| 70.00 | | 1.00 | 0.89 | 18.773 | 20.65 | 307.50 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 346.9 | 0.0 | 750.9 |
| 75.00 | Appurtenance(s) | 1.00 | 0.91 | 19.147 | 21.06 | 310.55 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 353.8 | 0.0 | 750.9 |
| 80.00 | Top - Section 4 | 1.00 | 0.93 | 19.503 | 21.45 | 313.43 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 360.4 | 0.0 | 750.9 |
| 85.00 | | 1.00 | 0.94 | 19.844 | 21.83 | 270.99 | 0.600 | 0.000 | 5.00 | 15.000 | 9.00 | 314.3 | 0.0 | 642.7 |
| 87.00 | Appurtenance(s) | 1.00 | 0.95 | 19.976 | 21.97 | 271.89 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 126.6 | 0.0 | 257.1 |
| 90.00 | | 1.00 | 0.96 | 20.170 | 22.19 | 273.21 | 0.600 | 0.000 | 3.00 | 9.000 | 5.40 | 191.7 | 0.0 | 385.6 |
| 91.00 | Appurtenance(s) | 1.00 | 0.96 | 20.234 | 22.26 | 273.64 | 0.600 | 0.000 | 1.00 | 3.000 | 1.80 | 64.1 | 0.0 | 128.5 |
| 95.00 | | 1.00 | 0.97 | 20.484 | 22.53 | 275.33 | 0.600 | 0.000 | 4.00 | 12.000 | 7.20 | 259.6 | 0.0 | 514.1 |
| 97.00 | Appurtenance(s) | 1.00 | 0.98 | 20.607 | 22.67 | 276.15 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 130.6 | 0.0 | 257.1 |
| 98.00 | Appurtenance(s) | 1.00 | 0.98 | 20.667 | 22.73 | 276.55 | 0.600 | 0.000 | 1.00 | 3.000 | 1.80 | 65.5 | 0.0 | 128.5 |
| 100.00 | | 1.00 | 0.99 | 20.787 | 22.87 | 277.35 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 131.7 | 0.0 | 257.1 |
| 105.00 | Appurtenance(s) | 1.00 | 1.00 | 21.079 | 23.19 | 279.29 | 0.600 | 0.000 | 5.00 | 15.000 | 9.00 | 333.9 | 0.0 | 642.7 |
| | | | | | | | | **Totals:** | **105.00** | | | **7,478.7** | | **17,825.4** |

# Discrete Appurtenance Forces

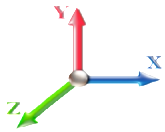
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 15 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 93 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 16

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | CaAa x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 105.00 | KRY KRY 112 144/2 TMA | 3 | 21.079 | 23.186 | 0.67 | 1.00 | 0.82 | 29.70 | 0.000 | 0.000 | 30.57 | 0.00 | 0.00 |
| 2 | 105.00 | 20' Omni | 1 | 21.687 | 23.856 | 1.00 | 1.00 | 6.00 | 49.50 | 0.000 | 11.000 | 229.02 | 0.00 | 2519.19 |
| 3 | 105.00 | AIR 21 B2A/B4P | 3 | 21.079 | 23.186 | 0.86 | 1.00 | 15.71 | 244.08 | 0.000 | 0.000 | 582.90 | 0.00 | 0.00 |
| 4 | 105.00 | Ericsson Radio 4449 B71 | 3 | 21.079 | 23.186 | 0.67 | 1.00 | 3.32 | 189.00 | 0.000 | 0.000 | 123.04 | 0.00 | 0.00 |
| 5 | 105.00 | Low Profile | 1 | 21.079 | 23.186 | 1.00 | 1.00 | 40.00 | 1350.00 | 0.000 | 0.000 | 1483.93 | 0.00 | 0.00 |
| 6 | 105.00 | AIR32 | 3 | 21.079 | 23.186 | 0.87 | 1.00 | 16.99 | 356.94 | 0.000 | 0.000 | 630.34 | 0.00 | 0.00 |
| 7 | 105.00 | APXVAARR24_43-U-NA2 | 3 | 21.079 | 23.186 | 0.70 | 1.00 | 42.50 | 345.60 | 0.000 | 0.000 | 1576.83 | 0.00 | 0.00 |
| 8 | 98.00 | DC2-48-60-8-18F-02 | 1 | 20.667 | 22.734 | 0.66 | 1.00 | 1.93 | 13.05 | 0.000 | 0.000 | 70.10 | 0.00 | 0.00 |
| 9 | 98.00 | RRUS-11 | 6 | 20.667 | 22.734 | 0.70 | 1.00 | 12.35 | 237.60 | 0.000 | 0.000 | 449.15 | 0.00 | 0.00 |
| 10 | 98.00 | Flush Mount | 1 | 20.667 | 22.734 | 1.00 | 1.00 | 5.00 | 315.00 | 0.000 | 0.000 | 181.87 | 0.00 | 0.00 |
| 11 | 97.00 | Low Profile | 1 | 20.607 | 22.667 | 1.00 | 1.00 | 22.00 | 1350.00 | 0.000 | 0.000 | 797.89 | 0.00 | 0.00 |
| 12 | 97.00 | 782 10250 | 6 | 20.607 | 22.667 | 0.61 | 0.80 | 1.90 | 34.56 | 0.000 | 0.000 | 68.80 | 0.00 | 0.00 |
| 13 | 97.00 | 860 10035 | 6 | 20.607 | 22.667 | 0.74 | 0.80 | 0.79 | 6.48 | 0.000 | 0.000 | 28.83 | 0.00 | 0.00 |
| 14 | 97.00 | LGP21401 | 6 | 20.607 | 22.667 | 0.54 | 0.80 | 4.15 | 76.14 | 0.000 | 0.000 | 150.46 | 0.00 | 0.00 |
| 15 | 97.00 | 800-10121 | 3 | 20.607 | 22.667 | 0.63 | 0.80 | 9.76 | 119.07 | 0.000 | 0.000 | 354.13 | 0.00 | 0.00 |
| 16 | 97.00 | AM-X-CD-16-65-00T-RET | 9 | 20.607 | 22.667 | 0.60 | 0.80 | 43.31 | 392.85 | 0.000 | 0.000 | 1570.69 | 0.00 | 0.00 |
| 17 | 91.00 | RRU | 3 | 20.234 | 22.258 | 0.88 | 1.00 | 5.07 | 113.40 | 0.000 | 0.000 | 180.51 | 0.00 | 0.00 |
| 18 | 91.00 | Horizon DUO Radios | 3 | 20.234 | 22.258 | 0.76 | 1.00 | 1.92 | 31.05 | 0.000 | 0.000 | 68.20 | 0.00 | 0.00 |
| 19 | 91.00 | VHLP2.5 | 3 | 20.234 | 22.258 | 1.00 | 1.00 | 25.29 | 128.52 | 0.000 | 0.000 | 900.63 | 0.00 | 0.00 |
| 20 | 87.00 | APXVTM14-C-120 | 3 | 19.976 | 21.974 | 0.63 | 0.80 | 12.02 | 151.20 | 0.000 | 0.000 | 422.62 | 0.00 | 0.00 |
| 21 | 87.00 | RRUS-11 1900 MHz | 3 | 19.976 | 21.974 | 0.56 | 0.80 | 4.94 | 118.80 | 0.000 | 0.000 | 173.65 | 0.00 | 0.00 |
| 22 | 87.00 | RRUS-11 800 MHz | 3 | 19.976 | 21.974 | 0.60 | 0.80 | 5.29 | 145.80 | 0.000 | 0.000 | 186.05 | 0.00 | 0.00 |
| 23 | 87.00 | APXVSPP18-C-A20 | 3 | 19.976 | 21.974 | 0.66 | 0.80 | 15.98 | 153.90 | 0.000 | 0.000 | 561.67 | 0.00 | 0.00 |
| 24 | 87.00 | TD-RRH8x20-25 | 3 | 19.976 | 21.974 | 0.55 | 0.80 | 6.71 | 189.00 | 0.000 | 0.000 | 235.80 | 0.00 | 0.00 |
| 25 | 87.00 | 800MHz Filter | 3 | 19.976 | 21.974 | 0.56 | 0.80 | 0.82 | 27.00 | 0.000 | 0.000 | 28.94 | 0.00 | 0.00 |
| 26 | 87.00 | ACU-A20-N | 4 | 19.976 | 21.974 | 0.63 | 0.80 | 0.35 | 3.60 | 0.000 | 0.000 | 12.44 | 0.00 | 0.00 |
| 27 | 87.00 | Low Profile | 1 | 19.976 | 21.974 | 1.00 | 1.00 | 22.00 | 1350.00 | 0.000 | 0.000 | 773.47 | 0.00 | 0.00 |
| 28 | 75.00 | GPS | 1 | 19.147 | 21.061 | 1.00 | 1.00 | 1.00 | 9.00 | 0.000 | 0.000 | 33.70 | 0.00 | 0.00 |
| 29 | 75.00 | Standoff Mount | 1 | 19.147 | 21.061 | 1.00 | 1.00 | 2.00 | 18.00 | 0.000 | 0.000 | 67.40 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **7,548.84** | | | **11,973.64** | | |

# Total Applied Force Summary

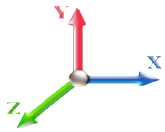
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | | **Code:** | EIA/TIA-222-G | 10/24/2018 |
| **Site Name:** | Avon | | **Exposure:** | B | |
| **Height:** | 105.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 16 |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 93 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 16

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 388.72 | 1234.26 | 0.00 | 0.00 |
| 10.00 | | 388.72 | 1234.26 | 0.00 | 0.00 |
| 15.00 | | 388.72 | 1234.26 | 0.00 | 0.00 |
| 20.00 | | 388.72 | 1234.26 | 0.00 | 0.00 |
| 25.00 | | 349.84 | 1126.03 | 0.00 | 0.00 |
| 30.00 | | 350.14 | 1126.03 | 0.00 | 0.00 |
| 35.00 | | 365.90 | 1126.03 | 0.00 | 0.00 |
| 40.00 | | 380.13 | 1126.03 | 0.00 | 0.00 |
| 45.00 | | 349.46 | 1017.79 | 0.00 | 0.00 |
| 50.00 | | 360.14 | 1017.79 | 0.00 | 0.00 |
| 55.00 | | 370.08 | 1017.79 | 0.00 | 0.00 |
| 60.00 | | 379.40 | 1017.79 | 0.00 | 0.00 |
| 65.00 | | 339.65 | 909.55 | 0.00 | 0.00 |
| 70.00 | | 346.92 | 909.55 | 0.00 | 0.00 |
| 75.00 | (2) attachments | 454.92 | 936.55 | 0.00 | 0.00 |
| 80.00 | | 360.41 | 908.83 | 0.00 | 0.00 |
| 85.00 | | 314.32 | 800.59 | 0.00 | 0.00 |
| 87.00 | (23) attachments | 2521.22 | 2459.54 | 0.00 | 0.00 |
| 90.00 | | 191.70 | 470.05 | 0.00 | 0.00 |
| 91.00 | (9) attachments | 1213.45 | 429.65 | 0.00 | 0.00 |
| 95.00 | | 259.58 | 623.28 | 0.00 | 0.00 |
| 97.00 | (31) attachments | 3101.36 | 2290.74 | 0.00 | 0.00 |
| 98.00 | (8) attachments | 766.59 | 707.86 | 0.00 | 0.00 |
| 100.00 | | 131.71 | 284.42 | 0.00 | 0.00 |
| 105.00 | (17) attachments | 4990.51 | 3275.88 | 0.00 | 2519.19 |
| | **Totals:** | **19,452.33** | **28,518.83** | **0.00** | **2,519.19** |

# Linear Appurtenance Segment Forces (Factored)

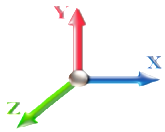
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 17 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 93 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 16

| Top Elev (ft) | Description | Wind Exposed | Length (ft) | Ca | Exposed Width (in) | Area (sqft) | CaAa (sqft) | Ra | Cf Adjust Factor | qz (psf) | F X (lb) | Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 4.68 |
| 5.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 0.72 |
| 10.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 4.68 |
| 10.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 0.72 |
| 15.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 4.68 |
| 15.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 0.72 |
| 20.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 4.68 |
| 20.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 14.724 | 0.00 | 0.72 |
| 25.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 14.724 | 0.00 | 4.68 |
| 25.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 14.724 | 0.00 | 0.72 |
| 30.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 14.736 | 0.00 | 4.68 |
| 30.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 14.736 | 0.00 | 0.72 |
| 35.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 15.400 | 0.00 | 4.68 |
| 35.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 15.400 | 0.00 | 0.72 |
| 40.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 15.999 | 0.00 | 4.68 |
| 40.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 15.999 | 0.00 | 0.72 |
| 45.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 16.546 | 0.00 | 4.68 |
| 45.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 16.546 | 0.00 | 0.72 |
| 50.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 17.052 | 0.00 | 4.68 |
| 50.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 17.052 | 0.00 | 0.72 |
| 55.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 17.523 | 0.00 | 4.68 |
| 55.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 17.523 | 0.00 | 0.72 |
| 60.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 17.964 | 0.00 | 4.68 |
| 60.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 17.964 | 0.00 | 0.72 |
| 65.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 18.380 | 0.00 | 4.68 |
| 65.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 18.380 | 0.00 | 0.72 |
| 70.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 18.773 | 0.00 | 4.68 |
| 70.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 18.773 | 0.00 | 0.72 |
| 75.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 19.147 | 0.00 | 4.68 |
| 75.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 19.147 | 0.00 | 0.72 |
| 80.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.015 | 0.000 | 19.503 | 0.00 | 4.68 |
| 85.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.017 | 0.000 | 19.844 | 0.00 | 4.68 |
| 87.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 19.976 | 0.00 | 1.87 |
| 90.00 | Step bolts (ladder) | Yes | 3.00 | 0.000 | 0.63 | 0.16 | 0.00 | 0.018 | 0.000 | 20.170 | 0.00 | 2.81 |
| 91.00 | Step bolts (ladder) | Yes | 1.00 | 0.000 | 0.63 | 0.05 | 0.00 | 0.018 | 0.000 | 20.234 | 0.00 | 0.94 |
| 95.00 | Step bolts (ladder) | Yes | 4.00 | 0.000 | 0.63 | 0.21 | 0.00 | 0.018 | 0.000 | 20.484 | 0.00 | 3.74 |
| 97.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 20.607 | 0.00 | 1.87 |
| 98.00 | Step bolts (ladder) | Yes | 1.00 | 0.000 | 0.63 | 0.05 | 0.00 | 0.018 | 0.000 | 20.667 | 0.00 | 0.94 |
| 100.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 20.787 | 0.00 | 1.87 |
| 105.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.017 | 0.000 | 21.079 | 0.00 | 4.68 |
| | | | | | | | | | **Totals:** | | **0.0** | **109.1** |

# Calculated Forces

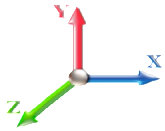
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 18 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.6W 93 mph Wind

**Dead Load Factor** 0.90

**Wind Load Factor** 1.60




**Iterations** 16

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -28.51 | -19.47 | 0.00 | -1581.2 | 0.00 | 1581.28 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.00 | 0.000 | 0.000 | 0.456 |
| 5.00 | -27.25 | -19.11 | 0.00 | -1483.9 | 0.00 | 1483.94 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.04 | -0.070 | 0.000 | 0.428 |
| 10.00 | -26.00 | -18.75 | 0.00 | -1388.3 | 0.00 | 1388.37 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.15 | -0.135 | 0.000 | 0.401 |
| 15.00 | -24.74 | -18.38 | 0.00 | -1294.6 | 0.00 | 1294.62 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.32 | -0.196 | 0.000 | 0.374 |
| 20.00 | -23.49 | -18.01 | 0.00 | -1202.7 | 0.00 | 1202.71 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.56 | -0.253 | 0.000 | 0.348 |
| 20.00 | -23.49 | -18.01 | 0.00 | -1202.7 | 0.00 | 1202.71 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.56 | -0.253 | 0.000 | 0.425 |
| 25.00 | -22.35 | -17.68 | 0.00 | -1112.6 | 0.00 | 1112.65 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.85 | -0.306 | 0.000 | 0.393 |
| 30.00 | -21.21 | -17.35 | 0.00 | -1024.2 | 0.00 | 1024.24 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 1.21 | -0.373 | 0.000 | 0.362 |
| 35.00 | -20.07 | -16.99 | 0.00 | -937.51 | 0.00 | 937.51 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 1.63 | -0.434 | 0.000 | 0.332 |
| 40.00 | -18.93 | -16.62 | 0.00 | -852.54 | 0.00 | 852.54 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 2.12 | -0.490 | 0.000 | 0.302 |
| 40.00 | -18.93 | -16.62 | 0.00 | -852.54 | 0.00 | 852.54 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 2.12 | -0.490 | 0.000 | 0.378 |
| 45.00 | -17.90 | -16.28 | 0.00 | -769.43 | 0.00 | 769.43 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 2.66 | -0.541 | 0.000 | 0.341 |
| 50.00 | -16.87 | -15.93 | 0.00 | -688.02 | 0.00 | 688.02 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 3.26 | -0.606 | 0.000 | 0.306 |
| 55.00 | -15.84 | -15.56 | 0.00 | -608.37 | 0.00 | 608.37 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 3.93 | -0.664 | 0.000 | 0.271 |
| 60.00 | -14.81 | -15.18 | 0.00 | -530.55 | 0.00 | 530.55 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 4.65 | -0.715 | 0.000 | 0.237 |
| 60.00 | -14.81 | -15.18 | 0.00 | -530.55 | 0.00 | 530.55 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 4.65 | -0.715 | 0.000 | 0.304 |
| 65.00 | -13.89 | -14.85 | 0.00 | -454.63 | 0.00 | 454.63 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 5.43 | -0.759 | 0.000 | 0.262 |
| 70.00 | -12.98 | -14.50 | 0.00 | -380.41 | 0.00 | 380.41 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 6.25 | -0.815 | 0.000 | 0.220 |
| 75.00 | -12.04 | -14.04 | 0.00 | -307.92 | 0.00 | 307.92 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 7.13 | -0.861 | 0.000 | 0.179 |
| 80.00 | -11.13 | -13.67 | 0.00 | -237.74 | 0.00 | 237.74 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 8.05 | -0.897 | 0.000 | 0.139 |
| 80.00 | -11.13 | -13.67 | 0.00 | -237.74 | 0.00 | 237.74 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 8.05 | -0.897 | 0.000 | 0.185 |
| 85.00 | -10.33 | -13.35 | 0.00 | -169.39 | 0.00 | 169.39 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 9.01 | -0.925 | 0.000 | 0.134 |
| 87.00 | -7.90 | -10.79 | 0.00 | -142.70 | 0.00 | 142.70 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 9.40 | -0.938 | 0.000 | 0.112 |
| 90.00 | -7.44 | -10.59 | 0.00 | -110.34 | 0.00 | 110.34 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 10.00 | -0.954 | 0.000 | 0.088 |
| 91.00 | -7.03 | -9.37 | 0.00 | -99.75 | 0.00 | 99.75 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 10.20 | -0.959 | 0.000 | 0.079 |
| 95.00 | -6.40 | -9.10 | 0.00 | -62.28 | 0.00 | 62.28 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 11.01 | -0.972 | 0.000 | 0.051 |
| 97.00 | -4.17 | -5.96 | 0.00 | -44.07 | 0.00 | 44.07 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 11.42 | -0.977 | 0.000 | 0.036 |
| 98.00 | -3.47 | -5.18 | 0.00 | -38.11 | 0.00 | 38.11 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 11.62 | -0.979 | 0.000 | 0.031 |
| 100.00 | -3.19 | -5.05 | 0.00 | -27.75 | 0.00 | 27.75 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 12.03 | -0.982 | 0.000 | 0.023 |
| 105.00 | 0.00 | -4.99 | 0.00 | -2.52 | 0.00 | 2.52 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 13.06 | -0.985 | 0.000 | 0.002 |

# Wind Loading - Shaft

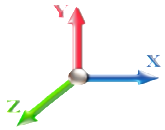
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 19 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 15

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.656 | 5.00 | 26.380 | 31.66 | 148.2 | 623.7 | 2057.9 |
| 10.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.775 | 5.00 | 26.479 | 31.77 | 148.8 | 669.8 | 2103.9 |
| 15.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.848 | 5.00 | 26.540 | 31.85 | 149.1 | 698.3 | 2132.5 |
| 20.00 | Top - Section 1 | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.902 | 5.00 | 26.585 | 31.90 | 149.4 | 719.3 | 2153.5 |
| 25.00 | | 1.00 | 0.70 | 4.256 | 4.68 | 0.00 | 1.200 | 1.945 | 5.00 | 24.121 | 28.95 | 135.5 | 664.8 | 1954.6 |
| 30.00 | | 1.00 | 0.70 | 4.260 | 4.69 | 0.00 | 1.200 | 1.981 | 5.00 | 24.151 | 28.98 | 135.8 | 677.4 | 1967.3 |
| 35.00 | | 1.00 | 0.73 | 4.451 | 4.90 | 0.00 | 1.200 | 2.012 | 5.00 | 24.177 | 29.01 | 142.1 | 688.4 | 1978.2 |
| 40.00 | Top - Section 2 | 1.00 | 0.76 | 4.625 | 5.09 | 0.00 | 1.200 | 2.039 | 5.00 | 24.199 | 29.04 | 147.7 | 697.9 | 1987.8 |
| 45.00 | | 1.00 | 0.79 | 4.783 | 5.26 | 0.00 | 1.200 | 2.063 | 5.00 | 21.719 | 26.06 | 137.1 | 630.9 | 1776.4 |
| 50.00 | | 1.00 | 0.81 | 4.929 | 5.42 | 0.00 | 1.200 | 2.085 | 5.00 | 21.737 | 26.08 | 141.4 | 637.9 | 1783.4 |
| 55.00 | | 1.00 | 0.83 | 5.065 | 5.57 | 0.00 | 1.200 | 2.105 | 5.00 | 21.754 | 26.10 | 145.4 | 644.2 | 1789.7 |
| 60.00 | Top - Section 3 | 1.00 | 0.85 | 5.193 | 5.71 | 0.00 | 1.200 | 2.123 | 5.00 | 21.769 | 26.12 | 149.2 | 650.1 | 1795.6 |
| 65.00 | | 1.00 | 0.87 | 5.313 | 5.84 | 0.00 | 1.200 | 2.140 | 5.00 | 19.284 | 23.14 | 135.2 | 577.1 | 1578.3 |
| 70.00 | | 1.00 | 0.89 | 5.426 | 5.97 | 0.00 | 1.200 | 2.156 | 5.00 | 19.297 | 23.16 | 138.2 | 581.6 | 1582.8 |
| 75.00 | Appurtenance(s) | 1.00 | 0.91 | 5.534 | 6.09 | 0.00 | 1.200 | 2.171 | 5.00 | 19.309 | 23.17 | 141.1 | 585.8 | 1587.0 |
| 80.00 | Top - Section 4 | 1.00 | 0.93 | 5.637 | 6.20 | 0.00 | 1.200 | 2.185 | 5.00 | 19.321 | 23.19 | 143.8 | 589.8 | 1591.0 |
| 85.00 | | 1.00 | 0.94 | 5.736 | 6.31 | 0.00 | 1.200 | 2.198 | 5.00 | 16.832 | 20.20 | 127.4 | 513.0 | 1369.9 |
| 87.00 | Appurtenance(s) | 1.00 | 0.95 | 5.774 | 6.35 | 0.00 | 1.200 | 2.204 | 2.00 | 6.735 | 8.08 | 51.3 | 205.7 | 548.5 |
| 90.00 | | 1.00 | 0.96 | 5.830 | 6.41 | 0.00 | 1.200 | 2.211 | 3.00 | 10.106 | 12.13 | 77.8 | 309.7 | 823.8 |
| 91.00 | Appurtenance(s) | 1.00 | 0.96 | 5.849 | 6.43 | 0.00 | 1.200 | 2.214 | 1.00 | 3.369 | 4.04 | 26.0 | 103.3 | 274.7 |
| 95.00 | | 1.00 | 0.97 | 5.921 | 6.51 | 0.00 | 1.200 | 2.223 | 4.00 | 13.482 | 16.18 | 105.4 | 415.3 | 1100.8 |
| 97.00 | Appurtenance(s) | 1.00 | 0.98 | 5.956 | 6.55 | 0.00 | 1.200 | 2.228 | 2.00 | 6.743 | 8.09 | 53.0 | 208.1 | 550.8 |
| 98.00 | Appurtenance(s) | 1.00 | 0.98 | 5.974 | 6.57 | 0.00 | 1.200 | 2.230 | 1.00 | 3.372 | 4.05 | 26.6 | 104.2 | 275.5 |
| 100.00 | | 1.00 | 0.99 | 6.008 | 6.61 | 0.00 | 1.200 | 2.234 | 2.00 | 6.745 | 8.09 | 53.5 | 208.8 | 551.5 |
| 105.00 | Appurtenance(s) | 1.00 | 1.00 | 6.093 | 6.70 | 0.00 | 1.200 | 2.245 | 5.00 | 16.871 | 20.25 | 135.7 | 524.6 | 1381.5 |
| | | | | | | | | **Totals:** | **105.00** | | | **2,944.7** | | **36,696.9** |

# Discrete Appurtenance Forces

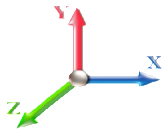
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 20 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 15

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | CaAa x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 105.00 | KRY KRY 112 144/2 TMA | 3 | 6.093 | 6.702 | 0.67 | 1.00 | 2.05 | 71.91 | 0.000 | 0.000 | 13.76 | 0.00 | 0.00 |
| 2 | 105.00 | 20' Omni | 1 | 6.269 | 6.896 | 1.00 | 1.00 | 15.13 | 216.74 | 0.000 | 11.000 | 104.32 | 0.00 | 1147.56 |
| 3 | 105.00 | AIR 21 B2A/B4P | 3 | 6.093 | 6.702 | 0.86 | 1.00 | 19.42 | 1014.00 | 0.000 | 0.000 | 130.18 | 0.00 | 0.00 |
| 4 | 105.00 | Ericsson Radio 4449 B71 | 3 | 6.093 | 6.702 | 0.67 | 1.00 | 4.75 | 535.29 | 0.000 | 0.000 | 31.84 | 0.00 | 0.00 |
| 5 | 105.00 | Low Profile | 1 | 6.093 | 6.702 | 1.00 | 1.00 | 81.32 | 3184.06 | 0.000 | 0.000 | 544.98 | 0.00 | 0.00 |
| 6 | 105.00 | AIR32 | 3 | 6.093 | 6.702 | 0.87 | 1.00 | 20.98 | 1225.39 | 0.000 | 0.000 | 140.64 | 0.00 | 0.00 |
| 7 | 105.00 | APXVAARR24_43-U-NA2 | 3 | 6.093 | 6.702 | 0.70 | 1.00 | 47.69 | 2133.22 | 0.000 | 0.000 | 319.64 | 0.00 | 0.00 |
| 8 | 98.00 | DC2-48-60-8-18F-02 | 1 | 5.974 | 6.571 | 0.66 | 1.00 | 2.95 | 80.10 | 0.000 | 0.000 | 19.40 | 0.00 | 0.00 |
| 9 | 98.00 | RRUS-11 | 6 | 5.974 | 6.571 | 0.70 | 1.00 | 18.87 | 717.89 | 0.000 | 0.000 | 123.99 | 0.00 | 0.00 |
| 10 | 98.00 | Flush Mount | 1 | 5.974 | 6.571 | 1.00 | 1.00 | 9.46 | 694.64 | 0.000 | 0.000 | 62.16 | 0.00 | 0.00 |
| 11 | 97.00 | Low Profile | 1 | 5.956 | 6.552 | 1.00 | 1.00 | 44.54 | 3170.77 | 0.000 | 0.000 | 291.86 | 0.00 | 0.00 |
| 12 | 97.00 | 782 10250 | 6 | 5.956 | 6.552 | 0.61 | 0.80 | 4.55 | 122.41 | 0.000 | 0.000 | 29.79 | 0.00 | 0.00 |
| 13 | 97.00 | 860 10035 | 6 | 5.956 | 6.552 | 0.74 | 0.80 | 2.93 | 44.96 | 0.000 | 0.000 | 19.20 | 0.00 | 0.00 |
| 14 | 97.00 | LGP21401 | 6 | 5.956 | 6.552 | 0.54 | 0.80 | 7.58 | 250.40 | 0.000 | 0.000 | 49.66 | 0.00 | 0.00 |
| 15 | 97.00 | 800-10121 | 3 | 5.956 | 6.552 | 0.63 | 0.80 | 14.86 | 499.91 | 0.000 | 0.000 | 97.38 | 0.00 | 0.00 |
| 16 | 97.00 | AM-X-CD-16-65-00T-RET | 9 | 5.956 | 6.552 | 0.60 | 0.80 | 62.56 | 1969.56 | 0.000 | 0.000 | 409.93 | 0.00 | 0.00 |
| 17 | 91.00 | RRU | 3 | 5.849 | 6.434 | 0.88 | 1.00 | 8.45 | 312.72 | 0.000 | 0.000 | 54.38 | 0.00 | 0.00 |
| 18 | 91.00 | Horizon DUO Radios | 3 | 5.849 | 6.434 | 0.76 | 1.00 | 3.84 | 107.94 | 0.000 | 0.000 | 24.68 | 0.00 | 0.00 |
| 19 | 91.00 | VHLP2.5 | 3 | 5.849 | 6.434 | 1.00 | 1.00 | 31.78 | 680.25 | 0.000 | 0.000 | 204.48 | 0.00 | 0.00 |
| 20 | 87.00 | APXVTM14-C-120 | 3 | 5.774 | 6.351 | 0.63 | 0.80 | 14.73 | 841.87 | 0.000 | 0.000 | 93.56 | 0.00 | 0.00 |
| 21 | 87.00 | RRUS-11 1900 MHz | 3 | 5.774 | 6.351 | 0.56 | 0.80 | 7.52 | 355.89 | 0.000 | 0.000 | 47.74 | 0.00 | 0.00 |
| 22 | 87.00 | RRUS-11 800 MHz | 3 | 5.774 | 6.351 | 0.60 | 0.80 | 8.05 | 415.76 | 0.000 | 0.000 | 51.15 | 0.00 | 0.00 |
| 23 | 87.00 | APXVSPP18-C-A20 | 3 | 5.774 | 6.351 | 0.66 | 0.80 | 23.00 | 711.45 | 0.000 | 0.000 | 146.10 | 0.00 | 0.00 |
| 24 | 87.00 | TD-RRH8x20-25 | 3 | 5.774 | 6.351 | 0.55 | 0.80 | 8.44 | 693.72 | 0.000 | 0.000 | 53.62 | 0.00 | 0.00 |
| 25 | 87.00 | 800MHz Filter | 3 | 5.774 | 6.351 | 0.56 | 0.80 | 2.01 | 82.99 | 0.000 | 0.000 | 12.79 | 0.00 | 0.00 |
| 26 | 87.00 | ACU-A20-N | 4 | 5.774 | 6.351 | 0.63 | 0.80 | 1.30 | 21.30 | 0.000 | 0.000 | 8.26 | 0.00 | 0.00 |
| 27 | 87.00 | Low Profile | 1 | 5.774 | 6.351 | 1.00 | 1.00 | 44.30 | 3152.69 | 0.000 | 0.000 | 281.37 | 0.00 | 0.00 |
| 28 | 75.00 | GPS | 1 | 5.534 | 6.088 | 1.00 | 1.00 | 1.89 | 40.47 | 0.000 | 0.000 | 11.48 | 0.00 | 0.00 |
| 29 | 75.00 | Standoff Mount | 1 | 5.534 | 6.088 | 1.00 | 1.00 | 3.74 | 4.84 | 0.000 | 0.000 | 22.75 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **23,353.15** | | | **3,401.11** | | |

# Total Applied Force Summary

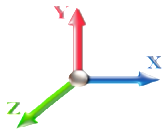
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | | **Code:** | EIA/TIA-222-G | 10/24/2018 |
| **Site Name:** | Avon | | **Exposure:** | B | |
| **Height:** | 105.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 21 |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 15

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 148.20 | 2311.47 | 0.00 | 0.00 |
| 10.00 | | 148.76 | 2363.10 | 0.00 | 0.00 |
| 15.00 | | 149.10 | 2395.26 | 0.00 | 0.00 |
| 20.00 | | 149.35 | 2419.01 | 0.00 | 0.00 |
| 25.00 | | 135.51 | 2222.37 | 0.00 | 0.00 |
| 30.00 | | 135.79 | 2236.93 | 0.00 | 0.00 |
| 35.00 | | 142.06 | 2249.48 | 0.00 | 0.00 |
| 40.00 | | 147.72 | 2260.54 | 0.00 | 0.00 |
| 45.00 | | 137.12 | 2050.52 | 0.00 | 0.00 |
| 50.00 | | 141.43 | 2058.70 | 0.00 | 0.00 |
| 55.00 | | 145.44 | 2066.18 | 0.00 | 0.00 |
| 60.00 | | 149.21 | 2073.09 | 0.00 | 0.00 |
| 65.00 | | 135.23 | 1856.75 | 0.00 | 0.00 |
| 70.00 | | 138.22 | 1862.17 | 0.00 | 0.00 |
| 75.00 | (2) attachments | 175.29 | 1912.57 | 0.00 | 0.00 |
| 80.00 | | 143.77 | 1836.22 | 0.00 | 0.00 |
| 85.00 | | 127.44 | 1615.48 | 0.00 | 0.00 |
| 87.00 | (23) attachments | 745.92 | 6922.42 | 0.00 | 0.00 |
| 90.00 | | 77.77 | 957.64 | 0.00 | 0.00 |
| 91.00 | (9) attachments | 309.55 | 1420.26 | 0.00 | 0.00 |
| 95.00 | | 105.37 | 1274.90 | 0.00 | 0.00 |
| 97.00 | (31) attachments | 950.83 | 6695.98 | 0.00 | 0.00 |
| 98.00 | (8) attachments | 232.14 | 1793.59 | 0.00 | 0.00 |
| 100.00 | | 53.49 | 602.43 | 0.00 | 0.00 |
| 105.00 | (17) attachments | 1421.05 | 9889.71 | 0.00 | 1147.56 |
| | **Totals:** | **6,345.78** | **65,346.77** | **0.00** | **1,147.56** |

# Linear Appurtenance Segment Forces (Factored)

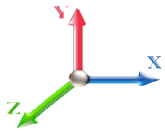
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 22 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 15

| Top Elev (ft) | Description | Wind Exposed | Length (ft) | Ca | Exposed Width (in) | Area (sqft) | CaAa (sqft) | Ra | Cf Adjust Factor | qz (psf) | F X (lb) | Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.64 | 0.00 | 0.021 | 0.000 | 4.256 | 0.00 | 27.18 |
| 5.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.65 | 0.00 | 0.021 | 0.000 | 4.256 | 0.00 | 22.08 |
| 10.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.74 | 0.00 | 0.021 | 0.000 | 4.256 | 0.00 | 29.96 |
| 10.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.75 | 0.00 | 0.021 | 0.000 | 4.256 | 0.00 | 24.87 |
| 15.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.80 | 0.00 | 0.021 | 0.000 | 4.256 | 0.00 | 31.77 |
| 15.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.81 | 0.00 | 0.021 | 0.000 | 4.256 | 0.00 | 26.68 |
| 20.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.85 | 0.00 | 0.021 | 0.000 | 4.256 | 0.00 | 33.13 |
| 20.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.86 | 0.00 | 0.021 | 0.000 | 4.256 | 0.00 | 28.05 |
| 25.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.88 | 0.00 | 0.024 | 0.000 | 4.256 | 0.00 | 34.25 |
| 25.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.89 | 0.00 | 0.024 | 0.000 | 4.256 | 0.00 | 29.17 |
| 30.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.91 | 0.00 | 0.024 | 0.000 | 4.260 | 0.00 | 35.19 |
| 30.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.92 | 0.00 | 0.024 | 0.000 | 4.260 | 0.00 | 30.12 |
| 35.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.94 | 0.00 | 0.024 | 0.000 | 4.451 | 0.00 | 36.02 |
| 35.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.95 | 0.00 | 0.024 | 0.000 | 4.451 | 0.00 | 30.95 |
| 40.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.96 | 0.00 | 0.024 | 0.000 | 4.625 | 0.00 | 36.75 |
| 40.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.97 | 0.00 | 0.024 | 0.000 | 4.625 | 0.00 | 31.68 |
| 45.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 1.98 | 0.00 | 0.027 | 0.000 | 4.783 | 0.00 | 37.42 |
| 45.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 1.99 | 0.00 | 0.027 | 0.000 | 4.783 | 0.00 | 32.35 |
| 50.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.00 | 0.00 | 0.027 | 0.000 | 4.929 | 0.00 | 38.02 |
| 50.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 2.01 | 0.00 | 0.027 | 0.000 | 4.929 | 0.00 | 32.96 |
| 55.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.02 | 0.00 | 0.027 | 0.000 | 5.065 | 0.00 | 38.58 |
| 55.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 2.02 | 0.00 | 0.027 | 0.000 | 5.065 | 0.00 | 33.52 |
| 60.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.03 | 0.00 | 0.027 | 0.000 | 5.193 | 0.00 | 39.10 |
| 60.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 2.04 | 0.00 | 0.027 | 0.000 | 5.193 | 0.00 | 34.04 |
| 65.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.05 | 0.00 | 0.030 | 0.000 | 5.313 | 0.00 | 39.59 |
| 65.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 2.05 | 0.00 | 0.030 | 0.000 | 5.313 | 0.00 | 34.53 |
| 70.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.06 | 0.00 | 0.030 | 0.000 | 5.426 | 0.00 | 40.04 |
| 70.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 2.07 | 0.00 | 0.030 | 0.000 | 5.426 | 0.00 | 34.99 |
| 75.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.07 | 0.00 | 0.030 | 0.000 | 5.534 | 0.00 | 40.47 |
| 75.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 2.08 | 0.00 | 0.030 | 0.000 | 5.534 | 0.00 | 35.42 |
| 80.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.08 | 0.00 | 0.015 | 0.000 | 5.637 | 0.00 | 40.88 |
| 85.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.09 | 0.00 | 0.017 | 0.000 | 5.736 | 0.00 | 41.27 |
| 87.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.84 | 0.00 | 0.018 | 0.000 | 5.774 | 0.00 | 16.57 |
| 90.00 | Step bolts (ladder) | Yes | 3.00 | 0.000 | 0.63 | 1.26 | 0.00 | 0.018 | 0.000 | 5.830 | 0.00 | 24.98 |
| 91.00 | Step bolts (ladder) | Yes | 1.00 | 0.000 | 0.63 | 0.42 | 0.00 | 0.018 | 0.000 | 5.849 | 0.00 | 8.34 |
| 95.00 | Step bolts (ladder) | Yes | 4.00 | 0.000 | 0.63 | 1.69 | 0.00 | 0.018 | 0.000 | 5.921 | 0.00 | 33.60 |
| 97.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.85 | 0.00 | 0.018 | 0.000 | 5.956 | 0.00 | 16.85 |
| 98.00 | Step bolts (ladder) | Yes | 1.00 | 0.000 | 0.63 | 0.42 | 0.00 | 0.018 | 0.000 | 5.974 | 0.00 | 8.44 |
| 100.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.85 | 0.00 | 0.018 | 0.000 | 6.008 | 0.00 | 16.93 |
| 105.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 2.13 | 0.00 | 0.017 | 0.000 | 6.093 | 0.00 | 42.66 |
| | | | | | | | | | | **Totals:** | **0.0** | **1,249.4** |

# Calculated Forces

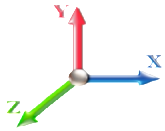
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 23 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0Di + 1.0Wi 50 mph Wind

**Dead Load Factor** 1.20

**Wind Load Factor** 1.00




**Iterations** 15

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -65.35 | -6.36 | 0.00 | -502.30 | 0.00 | 502.30 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.00 | 0.000 | 0.000 | 0.170 |
| 5.00 | -63.03 | -6.23 | 0.00 | -470.51 | 0.00 | 470.51 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.01 | -0.022 | 0.000 | 0.160 |
| 10.00 | -60.67 | -6.10 | 0.00 | -439.34 | 0.00 | 439.34 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.05 | -0.043 | 0.000 | 0.151 |
| 15.00 | -58.27 | -5.97 | 0.00 | -408.82 | 0.00 | 408.82 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.10 | -0.062 | 0.000 | 0.141 |
| 20.00 | -55.85 | -5.84 | 0.00 | -378.97 | 0.00 | 378.97 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.18 | -0.080 | 0.000 | 0.131 |
| 20.00 | -55.85 | -5.84 | 0.00 | -378.97 | 0.00 | 378.97 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.18 | -0.080 | 0.000 | 0.158 |
| 25.00 | -53.62 | -5.71 | 0.00 | -349.79 | 0.00 | 349.79 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.27 | -0.097 | 0.000 | 0.147 |
| 30.00 | -51.39 | -5.59 | 0.00 | -321.21 | 0.00 | 321.21 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.38 | -0.118 | 0.000 | 0.136 |
| 35.00 | -49.14 | -5.46 | 0.00 | -293.25 | 0.00 | 293.25 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.52 | -0.137 | 0.000 | 0.125 |
| 40.00 | -46.87 | -5.32 | 0.00 | -265.94 | 0.00 | 265.94 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.67 | -0.154 | 0.000 | 0.114 |
| 40.00 | -46.87 | -5.32 | 0.00 | -265.94 | 0.00 | 265.94 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 0.67 | -0.154 | 0.000 | 0.140 |
| 45.00 | -44.82 | -5.19 | 0.00 | -239.34 | 0.00 | 239.34 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 0.84 | -0.170 | 0.000 | 0.127 |
| 50.00 | -42.76 | -5.06 | 0.00 | -213.37 | 0.00 | 213.37 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 1.03 | -0.190 | 0.000 | 0.115 |
| 55.00 | -40.69 | -4.92 | 0.00 | -188.08 | 0.00 | 188.08 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 1.24 | -0.208 | 0.000 | 0.103 |
| 60.00 | -38.62 | -4.77 | 0.00 | -163.48 | 0.00 | 163.48 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 1.47 | -0.224 | 0.000 | 0.091 |
| 60.00 | -38.62 | -4.77 | 0.00 | -163.48 | 0.00 | 163.48 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 1.47 | -0.224 | 0.000 | 0.114 |
| 65.00 | -36.76 | -4.64 | 0.00 | -139.63 | 0.00 | 139.63 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 1.71 | -0.238 | 0.000 | 0.100 |
| 70.00 | -34.90 | -4.50 | 0.00 | -116.44 | 0.00 | 116.44 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 1.97 | -0.255 | 0.000 | 0.086 |
| 75.00 | -32.99 | -4.33 | 0.00 | -93.93 | 0.00 | 93.93 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 2.24 | -0.269 | 0.000 | 0.072 |
| 80.00 | -31.15 | -4.18 | 0.00 | -72.30 | 0.00 | 72.30 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 2.53 | -0.280 | 0.000 | 0.059 |
| 80.00 | -31.15 | -4.18 | 0.00 | -72.30 | 0.00 | 72.30 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.53 | -0.280 | 0.000 | 0.075 |
| 85.00 | -29.54 | -4.05 | 0.00 | -51.41 | 0.00 | 51.41 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.83 | -0.288 | 0.000 | 0.058 |
| 87.00 | -22.62 | -3.27 | 0.00 | -43.32 | 0.00 | 43.32 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.95 | -0.292 | 0.000 | 0.048 |
| 90.00 | -21.66 | -3.18 | 0.00 | -33.52 | 0.00 | 33.52 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.14 | -0.297 | 0.000 | 0.040 |
| 91.00 | -20.24 | -2.87 | 0.00 | -30.34 | 0.00 | 30.34 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.20 | -0.299 | 0.000 | 0.036 |
| 95.00 | -18.97 | -2.76 | 0.00 | -18.86 | 0.00 | 18.86 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.45 | -0.303 | 0.000 | 0.027 |
| 97.00 | -12.28 | -1.77 | 0.00 | -13.35 | 0.00 | 13.35 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.58 | -0.304 | 0.000 | 0.018 |
| 98.00 | -10.48 | -1.53 | 0.00 | -11.58 | 0.00 | 11.58 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.64 | -0.305 | 0.000 | 0.016 |
| 100.00 | -9.88 | -1.47 | 0.00 | -8.52 | 0.00 | 8.52 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.77 | -0.306 | 0.000 | 0.013 |
| 105.00 | 0.00 | -1.42 | 0.00 | -1.15 | 0.00 | 1.15 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 4.09 | -0.307 | 0.000 | 0.001 |

# Seismic Segment Forces (Factored)

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 24 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0E

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.19 | **Iterations** | 15 |
| **Dead Load Factor** | 1.20 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | **Ss** | 0.18 |
| **Wind Load Factor** | 0.00 | **Structure Frequency** | 0.78 | **SA** | 0.08 | **S1** | 0.06 |
| | | | | | | **Seismic Importance Factor** | 1.00 |

| Top Elev (ft) | Description | Wz (lb) | a | b | c | Lateral Fs (lb) | R: 1.50 |
|---|---|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.00 | | 1195.1 | 0.00 | 0.04 | 0.02 | 15.10 | |
| 10.00 | | 1195.1 | 0.02 | 0.06 | 0.04 | 22.13 | |
| 15.00 | | 1195.1 | 0.04 | 0.07 | 0.04 | 25.68 | |
| 20.00 | Top - Section 1 | 1195.1 | 0.07 | 0.07 | 0.04 | 28.05 | |
| 25.00 | | 1074.8 | 0.11 | 0.07 | 0.04 | 27.20 | |
| 30.00 | | 1074.8 | 0.15 | 0.07 | 0.03 | 29.18 | |
| 35.00 | | 1074.8 | 0.21 | 0.06 | 0.02 | 30.85 | |
| 40.00 | Top - Section 2 | 1074.8 | 0.27 | 0.05 | 0.01 | 31.53 | |
| 45.00 | | 954.60 | 0.35 | 0.03 | 0.01 | 27.07 | |
| 50.00 | | 954.60 | 0.43 | 0.01 | 0.01 | 24.11 | |
| 55.00 | | 954.60 | 0.52 | -0.02 | 0.01 | 19.18 | |
| 60.00 | Top - Section 3 | 954.60 | 0.62 | -0.06 | 0.02 | 13.20 | |
| 65.00 | | 834.33 | 0.72 | -0.09 | 0.03 | 7.07 | |
| 70.00 | | 834.33 | 0.84 | -0.12 | 0.07 | 5.64 | |
| 75.00 | Appurtenance(s) | 864.33 | 0.96 | -0.12 | 0.11 | 9.98 | |
| 80.00 | Top - Section 4 | 834.33 | 1.10 | -0.07 | 0.19 | 20.97 | |
| 85.00 | | 714.07 | 1.24 | 0.04 | 0.28 | 35.02 | |
| 87.00 | Appurtenance(s) | 2662.6 | 1.30 | 0.12 | 0.33 | 164.30 | |
| 90.00 | | 428.44 | 1.39 | 0.26 | 0.42 | 36.05 | |
| 91.00 | Appurtenance(s) | 446.11 | 1.42 | 0.32 | 0.45 | 41.28 | |
| 95.00 | | 571.25 | 1.55 | 0.62 | 0.60 | 74.76 | |
| 97.00 | Appurtenance(s) | 2484.6 | 1.61 | 0.82 | 0.69 | 379.89 | |
| 98.00 | Appurtenance(s) | 771.31 | 1.65 | 0.93 | 0.73 | 126.98 | |
| 100.00 | | 285.63 | 1.71 | 1.18 | 0.84 | 54.14 | |
| 105.00 | Appurtenance(s) | 3563.8 | 1.89 | 1.98 | 1.14 | 927.72 | |
| | **Totals:** | **28,193.6** | | | | **2,177.1** | **Total Wind:** **19,452.3** |

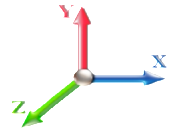
Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

# Calculated Forces

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 25 | |

Tower Engineering Solutions

**Load Case:** 1.2D + 1.0E




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.19 | **Iterations** | 15 |
| **Dead Load Factor** | 1.20 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | **Ss** | 0.18 |
| **Wind Load Factor** | 0.00 | **Structure Frequency** | 0.78 | **SA** | 0.08 | **S1** | 0.06 |
| | | | | | | **Seismic Importance Factor** | 1.00 |

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -38.02 | -2.18 | 0.00 | -198.70 | 0.00 | 198.70 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.00 | 0.00 | 0.073 |
| 5.00 | -36.38 | -2.17 | 0.00 | -187.80 | 0.00 | 187.80 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.00 | -0.01 | 0.069 |
| 10.00 | -34.73 | -2.15 | 0.00 | -176.95 | 0.00 | 176.95 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.02 | -0.02 | 0.065 |
| 15.00 | -33.09 | -2.13 | 0.00 | -166.19 | 0.00 | 166.19 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.04 | -0.02 | 0.062 |
| 20.00 | -31.44 | -2.11 | 0.00 | -155.54 | 0.00 | 155.54 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.07 | -0.03 | 0.058 |
| 20.00 | -31.44 | -2.11 | 0.00 | -155.54 | 0.00 | 155.54 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.07 | -0.03 | 0.069 |
| 25.00 | -29.94 | -2.08 | 0.00 | -145.01 | 0.00 | 145.01 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.11 | -0.04 | 0.065 |
| 30.00 | -28.44 | -2.06 | 0.00 | -134.60 | 0.00 | 134.60 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.15 | -0.05 | 0.060 |
| 35.00 | -26.94 | -2.03 | 0.00 | -124.33 | 0.00 | 124.33 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.21 | -0.06 | 0.056 |
| 40.00 | -25.43 | -2.00 | 0.00 | -114.19 | 0.00 | 114.19 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.27 | -0.06 | 0.052 |
| 40.00 | -25.43 | -2.00 | 0.00 | -114.19 | 0.00 | 114.19 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.27 | -0.06 | 0.063 |
| 45.00 | -24.08 | -1.97 | 0.00 | -104.21 | 0.00 | 104.21 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.34 | -0.07 | 0.058 |
| 50.00 | -22.72 | -1.95 | 0.00 | -94.35 | 0.00 | 94.35 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.42 | -0.08 | 0.053 |
| 55.00 | -21.36 | -1.93 | 0.00 | -84.61 | 0.00 | 84.61 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.51 | -0.09 | 0.048 |
| 60.00 | -20.01 | -1.92 | 0.00 | -74.96 | 0.00 | 74.96 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.60 | -0.09 | 0.043 |
| 60.00 | -20.01 | -1.92 | 0.00 | -74.96 | 0.00 | 74.96 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 0.60 | -0.09 | 0.054 |
| 65.00 | -18.79 | -1.91 | 0.00 | -65.37 | 0.00 | 65.37 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 0.70 | -0.10 | 0.048 |
| 70.00 | -17.58 | -1.91 | 0.00 | -55.81 | 0.00 | 55.81 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 0.81 | -0.11 | 0.042 |
| 75.00 | -16.33 | -1.89 | 0.00 | -46.29 | 0.00 | 46.29 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 0.93 | -0.12 | 0.036 |
| 80.00 | -15.12 | -1.87 | 0.00 | -36.81 | 0.00 | 36.81 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 1.06 | -0.12 | 0.030 |
| 80.00 | -15.12 | -1.87 | 0.00 | -36.81 | 0.00 | 36.81 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.06 | -0.12 | 0.038 |
| 85.00 | -14.05 | -1.84 | 0.00 | -27.45 | 0.00 | 27.45 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.19 | -0.13 | 0.030 |
| 87.00 | -10.77 | -1.66 | 0.00 | -23.78 | 0.00 | 23.78 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.24 | -0.13 | 0.025 |
| 90.00 | -10.15 | -1.63 | 0.00 | -18.79 | 0.00 | 18.79 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.32 | -0.13 | 0.021 |
| 91.00 | -9.57 | -1.59 | 0.00 | -17.16 | 0.00 | 17.16 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.35 | -0.13 | 0.019 |
| 95.00 | -8.74 | -1.51 | 0.00 | -10.82 | 0.00 | 10.82 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.46 | -0.13 | 0.014 |
| 97.00 | -5.69 | -1.12 | 0.00 | -7.80 | 0.00 | 7.80 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.51 | -0.13 | 0.010 |
| 98.00 | -4.74 | -0.99 | 0.00 | -6.68 | 0.00 | 6.68 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.54 | -0.13 | 0.008 |
| 100.00 | -4.37 | -0.94 | 0.00 | -4.69 | 0.00 | 4.69 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.60 | -0.13 | 0.006 |
| 105.00 | 0.00 | -0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.74 | -0.14 | 0.000 |

# Seismic Segment Forces (Factored)

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 26 | |

Tower Engineering Solutions

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Load Case:** | 0.9D + 1.0E | | | | | **Iterations** | 15 |
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.19 | **Ss** | 0.18 |
| **Dead Load Factor** | 0.90 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | **S1** | 0.06 |
| **Wind Load Factor** | 0.00 | **Structure Frequency** | 0.78 | **SA** | 0.08 | **Seismic Importance Factor** | 1.00 |

| Top Elev (ft) | Description | Wz (lb) | a | b | c | Lateral Fs (lb) | R: 1.50 |
|---|---|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5.00 | | 1195.1 | 0.00 | 0.04 | 0.02 | 15.10 | |
| 10.00 | | 1195.1 | 0.02 | 0.06 | 0.04 | 22.13 | |
| 15.00 | | 1195.1 | 0.04 | 0.07 | 0.04 | 25.68 | |
| 20.00 | Top - Section 1 | 1195.1 | 0.07 | 0.07 | 0.04 | 28.05 | |
| 25.00 | | 1074.8 | 0.11 | 0.07 | 0.04 | 27.20 | |
| 30.00 | | 1074.8 | 0.15 | 0.07 | 0.03 | 29.18 | |
| 35.00 | | 1074.8 | 0.21 | 0.06 | 0.02 | 30.85 | |
| 40.00 | Top - Section 2 | 1074.8 | 0.27 | 0.05 | 0.01 | 31.53 | |
| 45.00 | | 954.60 | 0.35 | 0.03 | 0.01 | 27.07 | |
| 50.00 | | 954.60 | 0.43 | 0.01 | 0.01 | 24.11 | |
| 55.00 | | 954.60 | 0.52 | -0.02 | 0.01 | 19.18 | |
| 60.00 | Top - Section 3 | 954.60 | 0.62 | -0.06 | 0.02 | 13.20 | |
| 65.00 | | 834.33 | 0.72 | -0.09 | 0.03 | 7.07 | |
| 70.00 | | 834.33 | 0.84 | -0.12 | 0.07 | 5.64 | |
| 75.00 | Appurtenance(s) | 864.33 | 0.96 | -0.12 | 0.11 | 9.98 | |
| 80.00 | Top - Section 4 | 834.33 | 1.10 | -0.07 | 0.19 | 20.97 | |
| 85.00 | | 714.07 | 1.24 | 0.04 | 0.28 | 35.02 | |
| 87.00 | Appurtenance(s) | 2662.6 | 1.30 | 0.12 | 0.33 | 164.30 | |
| 90.00 | | 428.44 | 1.39 | 0.26 | 0.42 | 36.05 | |
| 91.00 | Appurtenance(s) | 446.11 | 1.42 | 0.32 | 0.45 | 41.28 | |
| 95.00 | | 571.25 | 1.55 | 0.62 | 0.60 | 74.76 | |
| 97.00 | Appurtenance(s) | 2484.6 | 1.61 | 0.82 | 0.69 | 379.89 | |
| 98.00 | Appurtenance(s) | 771.31 | 1.65 | 0.93 | 0.73 | 126.98 | |
| 100.00 | | 285.63 | 1.71 | 1.18 | 0.84 | 54.14 | |
| 105.00 | Appurtenance(s) | 3563.8 | 1.89 | 1.98 | 1.14 | 927.72 | |
| | **Totals:** | **28,193.6** | | | | **2,177.1** | **Total Wind:** **19,452.3** |

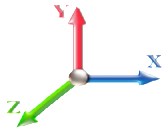
Seismic Base Shear is Less Than 50% of Wind Force - An Analysis is NOT Required

# Calculated Forces

| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 27 | |

Tower Engineering Solutions

**Load Case:** 0.9D + 1.0E




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Gust Response Factor** | 1.10 | | | **Sds** | 0.19 | **Iterations** | 15 |
| **Dead Load Factor** | 0.90 | **Seismic Load Factor** | 1.00 | **Sd1** | 0.10 | **Ss** | 0.18 |
| **Wind Load Factor** | 0.00 | **Structure Frequency** | 0.78 | **SA** | 0.08 | **S1** | 0.06 |
| | | | | | | **Seismic Importance Factor** | 1.00 |

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -28.52 | -2.18 | 0.00 | -198.06 | 0.00 | 198.06 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.00 | 0.00 | 0.068 |
| 5.00 | -27.28 | -2.17 | 0.00 | -187.16 | 0.00 | 187.16 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.00 | -0.01 | 0.065 |
| 10.00 | -26.05 | -2.15 | 0.00 | -176.32 | 0.00 | 176.32 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.02 | -0.02 | 0.061 |
| 15.00 | -24.81 | -2.13 | 0.00 | -165.58 | 0.00 | 165.58 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.04 | -0.02 | 0.058 |
| 20.00 | -23.58 | -2.10 | 0.00 | -154.94 | 0.00 | 154.94 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | | 0.07 | -0.03 | 0.054 |
| 20.00 | -23.58 | -2.10 | 0.00 | -154.94 | 0.00 | 154.94 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.07 | -0.03 | 0.065 |
| 25.00 | -22.45 | -2.08 | 0.00 | -144.44 | 0.00 | 144.44 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.11 | -0.04 | 0.061 |
| 30.00 | -21.33 | -2.05 | 0.00 | -134.06 | 0.00 | 134.06 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.15 | -0.05 | 0.057 |
| 35.00 | -20.20 | -2.02 | 0.00 | -123.82 | 0.00 | 123.82 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.21 | -0.06 | 0.052 |
| 40.00 | -19.08 | -1.99 | 0.00 | -113.72 | 0.00 | 113.72 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | | 0.27 | -0.06 | 0.048 |
| 40.00 | -19.08 | -1.99 | 0.00 | -113.72 | 0.00 | 113.72 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.27 | -0.06 | 0.059 |
| 45.00 | -18.06 | -1.96 | 0.00 | -103.78 | 0.00 | 103.78 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.34 | -0.07 | 0.054 |
| 50.00 | -17.04 | -1.94 | 0.00 | -93.96 | 0.00 | 93.96 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.42 | -0.08 | 0.050 |
| 55.00 | -16.02 | -1.92 | 0.00 | -84.26 | 0.00 | 84.26 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.51 | -0.09 | 0.045 |
| 60.00 | -15.00 | -1.91 | 0.00 | -74.65 | 0.00 | 74.65 | 1847.49 | 923.75 | 3635.30 | 2322.74 | | 0.60 | -0.09 | 0.040 |
| 60.00 | -15.00 | -1.91 | 0.00 | -74.65 | 0.00 | 74.65 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 0.60 | -0.09 | 0.051 |
| 65.00 | -14.09 | -1.90 | 0.00 | -65.10 | 0.00 | 65.10 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 0.70 | -0.10 | 0.045 |
| 70.00 | -13.18 | -1.90 | 0.00 | -55.59 | 0.00 | 55.59 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 0.81 | -0.11 | 0.039 |
| 75.00 | -12.25 | -1.89 | 0.00 | -46.11 | 0.00 | 46.11 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 0.93 | -0.11 | 0.033 |
| 80.00 | -11.34 | -1.86 | 0.00 | -36.68 | 0.00 | 36.68 | 1668.87 | 834.44 | 2866.90 | 1797.79 | | 1.05 | -0.12 | 0.027 |
| 80.00 | -11.34 | -1.86 | 0.00 | -36.68 | 0.00 | 36.68 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.05 | -0.12 | 0.035 |
| 85.00 | -10.54 | -1.83 | 0.00 | -27.36 | 0.00 | 27.36 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.18 | -0.12 | 0.027 |
| 87.00 | -8.08 | -1.66 | 0.00 | -23.70 | 0.00 | 23.70 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.23 | -0.13 | 0.023 |
| 90.00 | -7.61 | -1.62 | 0.00 | -18.73 | 0.00 | 18.73 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.31 | -0.13 | 0.019 |
| 91.00 | -7.18 | -1.58 | 0.00 | -17.10 | 0.00 | 17.10 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.34 | -0.13 | 0.018 |
| 95.00 | -6.56 | -1.50 | 0.00 | -10.78 | 0.00 | 10.78 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.45 | -0.13 | 0.012 |
| 97.00 | -4.27 | -1.12 | 0.00 | -7.78 | 0.00 | 7.78 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.51 | -0.13 | 0.009 |
| 98.00 | -3.56 | -0.99 | 0.00 | -6.66 | 0.00 | 6.66 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.54 | -0.13 | 0.007 |
| 100.00 | -3.27 | -0.94 | 0.00 | -4.68 | 0.00 | 4.68 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.59 | -0.13 | 0.006 |
| 105.00 | 0.00 | -0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 1490.10 | 745.05 | 2187.51 | 1339.68 | | 1.73 | -0.13 | 0.000 |

# Wind Loading - Shaft

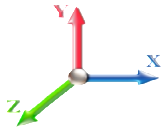
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 28 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 15

| Elev (ft) | Description | Kzt | Kz | qz (psf) | qzGh (psf) | C (mph-ft) | Cf | Ice Thick (in) | Tributary (ft) | Aa (sf) | CfAa (sf) | Wind Force X (lb) | Dead Load Ice (lb) | Tot Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 251.00 | 0.600 | 0.000 | 0.00 | 0.000 | 0.00 | 0.0 | 0.0 | 0.0 |
| 5.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 251.00 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 101.1 | 0.0 | 1195.1 |
| 10.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 251.00 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 101.1 | 0.0 | 1195.1 |
| 15.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 251.00 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 101.1 | 0.0 | 1195.1 |
| 20.00 | Top - Section 1 | 1.00 | 0.70 | 6.129 | 6.74 | 251.00 | 0.600 | 0.000 | 5.00 | 25.000 | 15.00 | 101.1 | 0.0 | 1195.1 |
| 25.00 | | 1.00 | 0.70 | 6.129 | 6.74 | 225.90 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 91.0 | 0.0 | 1074.9 |
| 30.00 | | 1.00 | 0.70 | 6.134 | 6.75 | 225.99 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 91.1 | 0.0 | 1074.9 |
| 35.00 | | 1.00 | 0.73 | 6.410 | 7.05 | 231.03 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 95.2 | 0.0 | 1074.9 |
| 40.00 | Top - Section 2 | 1.00 | 0.76 | 6.659 | 7.33 | 235.47 | 0.600 | 0.000 | 5.00 | 22.500 | 13.50 | 98.9 | 0.0 | 1074.9 |
| 45.00 | | 1.00 | 0.79 | 6.887 | 7.58 | 212.86 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 90.9 | 0.0 | 954.6 |
| 50.00 | | 1.00 | 0.81 | 7.098 | 7.81 | 216.09 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 93.7 | 0.0 | 954.6 |
| 55.00 | | 1.00 | 0.83 | 7.294 | 8.02 | 219.05 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 96.3 | 0.0 | 954.6 |
| 60.00 | Top - Section 3 | 1.00 | 0.85 | 7.477 | 8.22 | 221.79 | 0.600 | 0.000 | 5.00 | 20.000 | 12.00 | 98.7 | 0.0 | 954.6 |
| 65.00 | | 1.00 | 0.87 | 7.650 | 8.42 | 196.30 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 88.4 | 0.0 | 834.3 |
| 70.00 | | 1.00 | 0.89 | 7.814 | 8.60 | 198.39 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 90.3 | 0.0 | 834.3 |
| 75.00 | Appurtenance(s) | 1.00 | 0.91 | 7.969 | 8.77 | 200.35 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 92.0 | 0.0 | 834.3 |
| 80.00 | Top - Section 4 | 1.00 | 0.93 | 8.118 | 8.93 | 202.21 | 0.600 | 0.000 | 5.00 | 17.500 | 10.50 | 93.8 | 0.0 | 834.3 |
| 85.00 | | 1.00 | 0.94 | 8.260 | 9.09 | 174.83 | 0.600 | 0.000 | 5.00 | 15.000 | 9.00 | 81.8 | 0.0 | 714.1 |
| 87.00 | Appurtenance(s) | 1.00 | 0.95 | 8.315 | 9.15 | 175.41 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 32.9 | 0.0 | 285.6 |
| 90.00 | | 1.00 | 0.96 | 8.396 | 9.24 | 176.26 | 0.600 | 0.000 | 3.00 | 9.000 | 5.40 | 49.9 | 0.0 | 428.4 |
| 91.00 | Appurtenance(s) | 1.00 | 0.96 | 8.422 | 9.26 | 176.54 | 0.600 | 0.000 | 1.00 | 3.000 | 1.80 | 16.7 | 0.0 | 142.8 |
| 95.00 | | 1.00 | 0.97 | 8.526 | 9.38 | 177.63 | 0.600 | 0.000 | 4.00 | 12.000 | 7.20 | 67.5 | 0.0 | 571.3 |
| 97.00 | Appurtenance(s) | 1.00 | 0.98 | 8.577 | 9.43 | 178.16 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 34.0 | 0.0 | 285.6 |
| 98.00 | Appurtenance(s) | 1.00 | 0.98 | 8.602 | 9.46 | 178.42 | 0.600 | 0.000 | 1.00 | 3.000 | 1.80 | 17.0 | 0.0 | 142.8 |
| 100.00 | | 1.00 | 0.99 | 8.652 | 9.52 | 178.94 | 0.600 | 0.000 | 2.00 | 6.000 | 3.60 | 34.3 | 0.0 | 285.6 |
| 105.00 | Appurtenance(s) | 1.00 | 1.00 | 8.774 | 9.65 | 180.19 | 0.600 | 0.000 | 5.00 | 15.000 | 9.00 | 86.9 | 0.0 | 714.1 |
| | | | | | | | | **Totals:** | **105.00** | | | **1,945.5** | | **19,806.0** |

# Discrete Appurtenance Forces

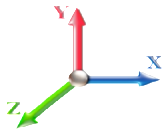
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 29 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 15

| No. | Elev (ft) | Description | Qty | qz (psf) | qzGh (psf) | CaAa x Ka | Ka | Total CaAa (sf) | Dead Load (lb) | Horiz Ecc (ft) | Vert Ecc (ft) | Wind FX (lb) | Mom Y (lb-ft) | Mom Z (lb-ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 105.00 | KRY KRY 112 144/2 TMA | 3 | 8.774 | 9.651 | 0.67 | 1.00 | 0.82 | 33.00 | 0.000 | 0.000 | 7.95 | 0.00 | 0.00 |
| 2 | 105.00 | 20' Omni | 1 | 9.027 | 9.930 | 1.00 | 1.00 | 6.00 | 55.00 | 0.000 | 11.000 | 59.58 | 0.00 | 655.36 |
| 3 | 105.00 | AIR 21 B2A/B4P | 3 | 8.774 | 9.651 | 0.86 | 1.00 | 15.71 | 271.20 | 0.000 | 0.000 | 151.64 | 0.00 | 0.00 |
| 4 | 105.00 | Ericsson Radio 4449 B71 | 3 | 8.774 | 9.651 | 0.67 | 1.00 | 3.32 | 210.00 | 0.000 | 0.000 | 32.01 | 0.00 | 0.00 |
| 5 | 105.00 | Low Profile | 1 | 8.774 | 9.651 | 1.00 | 1.00 | 40.00 | 1500.00 | 0.000 | 0.000 | 386.04 | 0.00 | 0.00 |
| 6 | 105.00 | AIR32 | 3 | 8.774 | 9.651 | 0.87 | 1.00 | 16.99 | 396.60 | 0.000 | 0.000 | 163.98 | 0.00 | 0.00 |
| 7 | 105.00 | APXVAARR24_43-U-NA2 | 3 | 8.774 | 9.651 | 0.70 | 1.00 | 42.50 | 384.00 | 0.000 | 0.000 | 410.21 | 0.00 | 0.00 |
| 8 | 98.00 | DC2-48-60-8-18F-02 | 1 | 8.602 | 9.463 | 0.66 | 1.00 | 1.93 | 14.50 | 0.000 | 0.000 | 18.24 | 0.00 | 0.00 |
| 9 | 98.00 | RRUS-11 | 6 | 8.602 | 9.463 | 0.70 | 1.00 | 12.35 | 264.00 | 0.000 | 0.000 | 116.84 | 0.00 | 0.00 |
| 10 | 98.00 | Flush Mount | 1 | 8.602 | 9.463 | 1.00 | 1.00 | 5.00 | 350.00 | 0.000 | 0.000 | 47.31 | 0.00 | 0.00 |
| 11 | 97.00 | Low Profile | 1 | 8.577 | 9.435 | 1.00 | 1.00 | 22.00 | 1500.00 | 0.000 | 0.000 | 207.57 | 0.00 | 0.00 |
| 12 | 97.00 | 782 10250 | 6 | 8.577 | 9.435 | 0.61 | 0.80 | 1.90 | 38.40 | 0.000 | 0.000 | 17.90 | 0.00 | 0.00 |
| 13 | 97.00 | 860 10035 | 6 | 8.577 | 9.435 | 0.74 | 0.80 | 0.79 | 7.20 | 0.000 | 0.000 | 7.50 | 0.00 | 0.00 |
| 14 | 97.00 | LGP21401 | 6 | 8.577 | 9.435 | 0.54 | 0.80 | 4.15 | 84.60 | 0.000 | 0.000 | 39.14 | 0.00 | 0.00 |
| 15 | 97.00 | 800-10121 | 3 | 8.577 | 9.435 | 0.63 | 0.80 | 9.76 | 132.30 | 0.000 | 0.000 | 92.13 | 0.00 | 0.00 |
| 16 | 97.00 | AM-X-CD-16-65-00T-RET | 9 | 8.577 | 9.435 | 0.60 | 0.80 | 43.31 | 436.50 | 0.000 | 0.000 | 408.61 | 0.00 | 0.00 |
| 17 | 91.00 | RRU | 3 | 8.422 | 9.264 | 0.88 | 1.00 | 5.07 | 126.00 | 0.000 | 0.000 | 46.96 | 0.00 | 0.00 |
| 18 | 91.00 | Horizon DUO Radios | 3 | 8.422 | 9.264 | 0.76 | 1.00 | 1.92 | 34.50 | 0.000 | 0.000 | 17.74 | 0.00 | 0.00 |
| 19 | 91.00 | VHLP2.5 | 3 | 8.422 | 9.264 | 1.00 | 1.00 | 25.29 | 142.80 | 0.000 | 0.000 | 234.30 | 0.00 | 0.00 |
| 20 | 87.00 | APXVTM14-C-120 | 3 | 8.315 | 9.146 | 0.63 | 0.80 | 12.02 | 168.00 | 0.000 | 0.000 | 109.94 | 0.00 | 0.00 |
| 21 | 87.00 | RRUS-11 1900 MHz | 3 | 8.315 | 9.146 | 0.56 | 0.80 | 4.94 | 132.00 | 0.000 | 0.000 | 45.17 | 0.00 | 0.00 |
| 22 | 87.00 | RRUS-11 800 MHz | 3 | 8.315 | 9.146 | 0.60 | 0.80 | 5.29 | 162.00 | 0.000 | 0.000 | 48.40 | 0.00 | 0.00 |
| 23 | 87.00 | APXVSPP18-C-A20 | 3 | 8.315 | 9.146 | 0.66 | 0.80 | 15.98 | 171.00 | 0.000 | 0.000 | 146.12 | 0.00 | 0.00 |
| 24 | 87.00 | TD-RRH8x20-25 | 3 | 8.315 | 9.146 | 0.55 | 0.80 | 6.71 | 210.00 | 0.000 | 0.000 | 61.34 | 0.00 | 0.00 |
| 25 | 87.00 | 800MHz Filter | 3 | 8.315 | 9.146 | 0.56 | 0.80 | 0.82 | 30.00 | 0.000 | 0.000 | 7.53 | 0.00 | 0.00 |
| 26 | 87.00 | ACU-A20-N | 4 | 8.315 | 9.146 | 0.63 | 0.80 | 0.35 | 4.00 | 0.000 | 0.000 | 3.24 | 0.00 | 0.00 |
| 27 | 87.00 | Low Profile | 1 | 8.315 | 9.146 | 1.00 | 1.00 | 22.00 | 1500.00 | 0.000 | 0.000 | 201.21 | 0.00 | 0.00 |
| 28 | 75.00 | GPS | 1 | 7.969 | 8.766 | 1.00 | 1.00 | 1.00 | 10.00 | 0.000 | 0.000 | 8.77 | 0.00 | 0.00 |
| 29 | 75.00 | Standoff Mount | 1 | 7.969 | 8.766 | 1.00 | 1.00 | 2.00 | 20.00 | 0.000 | 0.000 | 17.53 | 0.00 | 0.00 |
| | | | | | | | **Totals:** | | **8,387.60** | | | **3,114.89** | | |

# Total Applied Force Summary

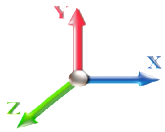
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | | **Code:** | EIA/TIA-222-G | 10/24/2018 |
| **Site Name:** | Avon | | **Exposure:** | B | |
| **Height:** | 105.00 (ft) | | **Crest Height:** | 0.00 | |
| **Base Elev:** | 0.000 (ft) | | **Site Class:** | D - Stiff Soil | |
| **Gh:** | 1.1 | **Topography:** 1 | **Struct Class:** | II | Page: 30 |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 15

| Elev (ft) | Description | Lateral FX (-) (lb) | Axial FY (-) (lb) | Torsion MY (lb-ft) | Moment MZ (lb-ft) |
|---|---|---|---|---|---|
| 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | | 101.12 | 1371.40 | 0.00 | 0.00 |
| 10.00 | | 101.12 | 1371.40 | 0.00 | 0.00 |
| 15.00 | | 101.12 | 1371.40 | 0.00 | 0.00 |
| 20.00 | | 101.12 | 1371.40 | 0.00 | 0.00 |
| 25.00 | | 91.01 | 1251.14 | 0.00 | 0.00 |
| 30.00 | | 91.09 | 1251.14 | 0.00 | 0.00 |
| 35.00 | | 95.19 | 1251.14 | 0.00 | 0.00 |
| 40.00 | | 98.89 | 1251.14 | 0.00 | 0.00 |
| 45.00 | | 90.91 | 1130.88 | 0.00 | 0.00 |
| 50.00 | | 93.69 | 1130.88 | 0.00 | 0.00 |
| 55.00 | | 96.28 | 1130.88 | 0.00 | 0.00 |
| 60.00 | | 98.70 | 1130.88 | 0.00 | 0.00 |
| 65.00 | | 88.36 | 1010.61 | 0.00 | 0.00 |
| 70.00 | | 90.25 | 1010.61 | 0.00 | 0.00 |
| 75.00 | (2) attachments | 118.35 | 1040.61 | 0.00 | 0.00 |
| 80.00 | | 93.76 | 1009.81 | 0.00 | 0.00 |
| 85.00 | | 81.77 | 889.55 | 0.00 | 0.00 |
| 87.00 | (23) attachments | 655.88 | 2732.82 | 0.00 | 0.00 |
| 90.00 | | 49.87 | 522.28 | 0.00 | 0.00 |
| 91.00 | (9) attachments | 315.67 | 477.39 | 0.00 | 0.00 |
| 95.00 | | 67.53 | 692.53 | 0.00 | 0.00 |
| 97.00 | (31) attachments | 806.81 | 2545.27 | 0.00 | 0.00 |
| 98.00 | (8) attachments | 199.43 | 786.51 | 0.00 | 0.00 |
| 100.00 | | 34.26 | 316.03 | 0.00 | 0.00 |
| 105.00 | (17) attachments | 1298.26 | 3639.87 | 0.00 | 655.36 |
| | **Totals:** | **5,060.44** | **31,687.58** | **0.00** | **655.36** |

# Linear Appurtenance Segment Forces (Factored)

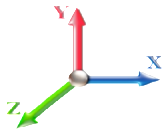
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 31 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 15

| Top Elev (ft) | Description | Wind Exposed | Length (ft) | Ca | Exposed Width (in) | Area (sqft) | CaAa (sqft) | Ra | Cf Adjust Factor | qz (psf) | F X (lb) | Dead Load (lb) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 6.129 | 0.00 | 5.20 |
| 5.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 6.129 | 0.00 | 0.80 |
| 10.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 6.129 | 0.00 | 5.20 |
| 10.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 6.129 | 0.00 | 0.80 |
| 15.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 6.129 | 0.00 | 5.20 |
| 15.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 6.129 | 0.00 | 0.80 |
| 20.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.021 | 0.000 | 6.129 | 0.00 | 5.20 |
| 20.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.021 | 0.000 | 6.129 | 0.00 | 0.80 |
| 25.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 6.129 | 0.00 | 5.20 |
| 25.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 6.129 | 0.00 | 0.80 |
| 30.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 6.134 | 0.00 | 5.20 |
| 30.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 6.134 | 0.00 | 0.80 |
| 35.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 6.410 | 0.00 | 5.20 |
| 35.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 6.410 | 0.00 | 0.80 |
| 40.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.024 | 0.000 | 6.659 | 0.00 | 5.20 |
| 40.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.024 | 0.000 | 6.659 | 0.00 | 0.80 |
| 45.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 6.887 | 0.00 | 5.20 |
| 45.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 6.887 | 0.00 | 0.80 |
| 50.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 7.098 | 0.00 | 5.20 |
| 50.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 7.098 | 0.00 | 0.80 |
| 55.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 7.294 | 0.00 | 5.20 |
| 55.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 7.294 | 0.00 | 0.80 |
| 60.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.027 | 0.000 | 7.477 | 0.00 | 5.20 |
| 60.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.027 | 0.000 | 7.477 | 0.00 | 0.80 |
| 65.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 7.650 | 0.00 | 5.20 |
| 65.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 7.650 | 0.00 | 0.80 |
| 70.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 7.814 | 0.00 | 5.20 |
| 70.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 7.814 | 0.00 | 0.80 |
| 75.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.030 | 0.000 | 7.969 | 0.00 | 5.20 |
| 75.00 | 1/2" Coax | Yes | 5.00 | 0.000 | 0.65 | 0.27 | 0.00 | 0.030 | 0.000 | 7.969 | 0.00 | 0.80 |
| 80.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.015 | 0.000 | 8.118 | 0.00 | 5.20 |
| 85.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.017 | 0.000 | 8.260 | 0.00 | 5.20 |
| 87.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 8.315 | 0.00 | 2.08 |
| 90.00 | Step bolts (ladder) | Yes | 3.00 | 0.000 | 0.63 | 0.16 | 0.00 | 0.018 | 0.000 | 8.396 | 0.00 | 3.12 |
| 91.00 | Step bolts (ladder) | Yes | 1.00 | 0.000 | 0.63 | 0.05 | 0.00 | 0.018 | 0.000 | 8.422 | 0.00 | 1.04 |
| 95.00 | Step bolts (ladder) | Yes | 4.00 | 0.000 | 0.63 | 0.21 | 0.00 | 0.018 | 0.000 | 8.526 | 0.00 | 4.16 |
| 97.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 8.577 | 0.00 | 2.08 |
| 98.00 | Step bolts (ladder) | Yes | 1.00 | 0.000 | 0.63 | 0.05 | 0.00 | 0.018 | 0.000 | 8.602 | 0.00 | 1.04 |
| 100.00 | Step bolts (ladder) | Yes | 2.00 | 0.000 | 0.63 | 0.10 | 0.00 | 0.018 | 0.000 | 8.652 | 0.00 | 2.08 |
| 105.00 | Step bolts (ladder) | Yes | 5.00 | 0.000 | 0.63 | 0.26 | 0.00 | 0.017 | 0.000 | 8.774 | 0.00 | 5.20 |
| | | | | | | | | | **Totals:** | | **0.0** | **121.2** |

# Calculated Forces

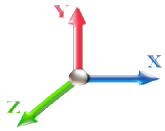
| | | | | | |
|---|---|---|---|---|---|
| **Structure:** | CT01498-S-SBA | **Code:** | EIA/TIA-222-G | 10/24/2018 | |
| **Site Name:** | Avon | **Exposure:** | B | | |
| **Height:** | 105.00 (ft) | **Crest Height:** | 0.00 | | |
| **Base Elev:** | 0.000 (ft) | **Site Class:** | D - Stiff Soil | | |
| **Gh:** | 1.1 **Topography:** 1 | **Struct Class:** | II | Page: 32 | |

Tower Engineering Solutions

**Load Case:** 1.0D + 1.0W 60 mph Wind

**Dead Load Factor** 1.00

**Wind Load Factor** 1.00




**Iterations** 15

| Seg Elev (ft) | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Total Deflect (in) | Rotation Sway (deg) | Rotation Twist (deg) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | -31.69 | -5.06 | 0.00 | -411.76 | 0.00 | 411.76 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.00 | 0.000 | 0.000 | 0.130 |
| 5.00 | -30.31 | -4.97 | 0.00 | -386.44 | 0.00 | 386.44 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.01 | -0.018 | 0.000 | 0.122 |
| 10.00 | -28.94 | -4.88 | 0.00 | -361.57 | 0.00 | 361.57 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.04 | -0.035 | 0.000 | 0.114 |
| 15.00 | -27.57 | -4.78 | 0.00 | -337.18 | 0.00 | 337.18 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.08 | -0.051 | 0.000 | 0.107 |
| 20.00 | -26.20 | -4.69 | 0.00 | -313.25 | 0.00 | 313.25 | 2204.43 | 1102.21 | 5439.15 | 3573.20 | 0.15 | -0.066 | 0.000 | 0.100 |
| 20.00 | -26.20 | -4.69 | 0.00 | -313.25 | 0.00 | 313.25 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.15 | -0.066 | 0.000 | 0.120 |
| 25.00 | -24.94 | -4.60 | 0.00 | -289.81 | 0.00 | 289.81 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.22 | -0.080 | 0.000 | 0.112 |
| 30.00 | -23.69 | -4.52 | 0.00 | -266.80 | 0.00 | 266.80 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.32 | -0.097 | 0.000 | 0.103 |
| 35.00 | -22.44 | -4.43 | 0.00 | -244.21 | 0.00 | 244.21 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.43 | -0.113 | 0.000 | 0.095 |
| 40.00 | -21.19 | -4.33 | 0.00 | -222.09 | 0.00 | 222.09 | 2026.00 | 1013.00 | 4492.72 | 2914.55 | 0.55 | -0.128 | 0.000 | 0.087 |
| 40.00 | -21.19 | -4.33 | 0.00 | -222.09 | 0.00 | 222.09 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 0.55 | -0.128 | 0.000 | 0.107 |
| 45.00 | -20.06 | -4.24 | 0.00 | -200.44 | 0.00 | 200.44 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 0.69 | -0.141 | 0.000 | 0.097 |
| 50.00 | -18.92 | -4.15 | 0.00 | -179.24 | 0.00 | 179.24 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 0.85 | -0.158 | 0.000 | 0.087 |
| 55.00 | -17.79 | -4.05 | 0.00 | -158.49 | 0.00 | 158.49 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 1.02 | -0.173 | 0.000 | 0.078 |
| 60.00 | -16.66 | -3.96 | 0.00 | -138.22 | 0.00 | 138.22 | 1847.49 | 923.75 | 3635.30 | 2322.74 | 1.21 | -0.186 | 0.000 | 0.069 |
| 60.00 | -16.66 | -3.96 | 0.00 | -138.22 | 0.00 | 138.22 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 1.21 | -0.186 | 0.000 | 0.087 |
| 65.00 | -15.65 | -3.87 | 0.00 | -118.44 | 0.00 | 118.44 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 1.41 | -0.198 | 0.000 | 0.075 |
| 70.00 | -14.64 | -3.78 | 0.00 | -99.11 | 0.00 | 99.11 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 1.63 | -0.212 | 0.000 | 0.064 |
| 75.00 | -13.60 | -3.66 | 0.00 | -80.22 | 0.00 | 80.22 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 1.86 | -0.224 | 0.000 | 0.053 |
| 80.00 | -12.59 | -3.56 | 0.00 | -61.94 | 0.00 | 61.94 | 1668.87 | 834.44 | 2866.90 | 1797.79 | 2.10 | -0.234 | 0.000 | 0.042 |
| 80.00 | -12.59 | -3.56 | 0.00 | -61.94 | 0.00 | 61.94 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.10 | -0.234 | 0.000 | 0.055 |
| 85.00 | -11.70 | -3.48 | 0.00 | -44.13 | 0.00 | 44.13 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.35 | -0.241 | 0.000 | 0.041 |
| 87.00 | -8.97 | -2.81 | 0.00 | -37.18 | 0.00 | 37.18 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.45 | -0.244 | 0.000 | 0.034 |
| 90.00 | -8.45 | -2.76 | 0.00 | -28.74 | 0.00 | 28.74 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.60 | -0.249 | 0.000 | 0.027 |
| 91.00 | -7.97 | -2.44 | 0.00 | -25.99 | 0.00 | 25.99 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.66 | -0.250 | 0.000 | 0.025 |
| 95.00 | -7.28 | -2.37 | 0.00 | -16.22 | 0.00 | 16.22 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.87 | -0.253 | 0.000 | 0.017 |
| 97.00 | -4.74 | -1.55 | 0.00 | -11.48 | 0.00 | 11.48 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 2.97 | -0.254 | 0.000 | 0.012 |
| 98.00 | -3.95 | -1.35 | 0.00 | -9.93 | 0.00 | 9.93 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.03 | -0.255 | 0.000 | 0.010 |
| 100.00 | -3.63 | -1.31 | 0.00 | -7.23 | 0.00 | 7.23 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.13 | -0.256 | 0.000 | 0.008 |
| 105.00 | 0.00 | -1.30 | 0.00 | -0.66 | 0.00 | 0.66 | 1490.10 | 745.05 | 2187.51 | 1339.68 | 3.40 | -0.257 | 0.000 | 0.000 |

## Reactions

| Load Case | Shear FX (kips) | Shear FZ (kips) | Axial FY (kips) | Moment MX (ft-kips) | Moment MY (ft-kips) | Moment MZ (ft-kips) |
|---|---|---|---|---|---|---|
| 1.2D + 1.6W 93 mph Wind | 19.5 | 0.00 | 38.01 | 0.00 | 0.00 | 1586.19 |
| 0.9D + 1.6W 93 mph Wind | 19.5 | 0.00 | 28.51 | 0.00 | 0.00 | 1581.28 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | 6.4 | 0.00 | 65.35 | 0.00 | 0.00 | 502.30 |
| 1.2D + 1.0E | 2.2 | 0.00 | 38.02 | 0.00 | 0.00 | 198.70 |
| 0.9D + 1.0E | 2.2 | 0.00 | 28.52 | 0.00 | 0.00 | 198.06 |
| 1.0D + 1.0W 60 mph Wind | 5.1 | 0.00 | 31.69 | 0.00 | 0.00 | 411.76 |

## Max Stresses

| Load Case | Pu FY (-) (kips) | Vu FX (-) (kips) | Tu MY (-) (ft-kips) | Mu MZ (ft-kips) | Mu MX (ft-kips) | Resultant Moment (ft-kips) | phi Pn (kips) | phi Vn (kips) | phi Tn (ft-kips) | phi Mn (ft-kips) | Elev (ft) | Stress Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.2D + 1.6W 93 mph Wind | -38.01 | -19.48 | 0.00 | -1586.1 | 0.00 | -1586.1 | 2204.43 | 1102.2 | 5439.15 | 3573.20 | 0.00 | 0.461 |
| 0.9D + 1.6W 93 mph Wind | -28.51 | -19.47 | 0.00 | -1581.2 | 0.00 | -1581.2 | 2204.43 | 1102.2 | 5439.15 | 3573.20 | 0.00 | 0.456 |
| 1.2D + 1.0Di + 1.0Wi 50 mph Wind | -65.35 | -6.36 | 0.00 | -502.30 | 0.00 | -502.30 | 2204.43 | 1102.2 | 5439.15 | 3573.20 | 0.00 | 0.170 |
| 1.2D + 1.0E | -38.02 | -2.18 | 0.00 | -198.70 | 0.00 | -198.70 | 2204.43 | 1102.2 | 5439.15 | 3573.20 | 0.00 | 0.073 |
| 0.9D + 1.0E | -28.52 | -2.18 | 0.00 | -198.06 | 0.00 | -198.06 | 2204.43 | 1102.2 | 5439.15 | 3573.20 | 0.00 | 0.068 |
| 1.0D + 1.0W 60 mph Wind | -31.69 | -5.06 | 0.00 | -411.76 | 0.00 | -411.76 | 2204.43 | 1102.2 | 5439.15 | 3573.20 | 0.00 | 0.130 |

# Monopole Mat Foundation Design

| | | | |
|---|---|---|---|
| | | | Date: 10/24/2017 |
| **Customer Name:** | SBA Communcations Corp | **EIA/TIA Standard:** | EIA-222-G |
| **Site Name:** | Avon | **Structure Height (Ft.):** | 180 |
| **Site Number:** | CT01498-S-SBA | **Engineer Name:** | T. Alajaj |
| **Engr. Number:** | | **Engineer Login ID:** | |

**Foundation Info Obtained from:** Drawings/Calculations

**Structure Type:** Monopole

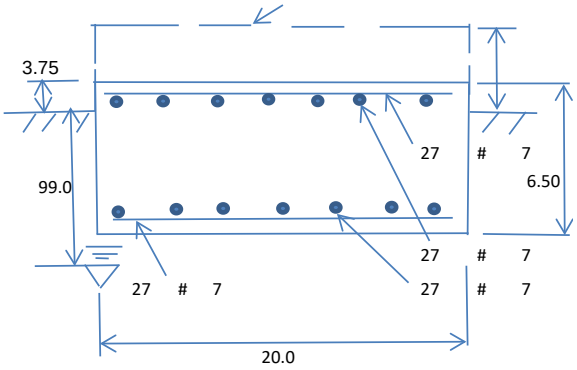
**Analysis or Design?** Analysis

**Base Reactions (Factored):**

| | | | |
|---|---|---|---|
| Axial Load (Kips): | 65.3 | Shear Force (Kips): | 19.5 |
| Uplift Force (Kips): | 0.0 | Moment (Kips-ft): | 1586.2 |
| Allowable overstress %: | 5.0% | | |

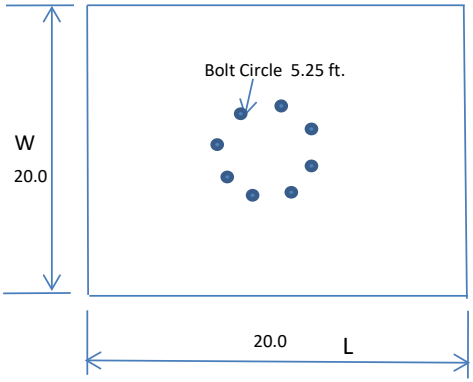
**Foundation Geometries:**

| | | | |
|---|---|---|---|
| | | Mods required -Yes/No ?: | No |
| Anchor Bolt Circle (ft.): | 5.25 | Depth of Base BG (ft.): | 2.75 |
| Thickness of Pad (ft): | 6.50 | | |
| Length of Pad (ft.): | 20 | Width of Pad (ft.): | 20 |
| Final Length of pad (ft) | 20.0 | Final width of pad (ft): | 20.0 |




**Material Properties and Reabr Info:**

| | | | | |
|---|---|---|---|---|
| Concrete Strength (psi): | 4000 | Steel Elastic Modulus: | 29000 | ksi |
| Pad Rebar Yield (Ksi): | 60 | Tie Spacing (in): | 12.0 | |
| Pad Steel Rebar Size (#): | 7 | | | |
| Concrete Cover (in.): | 3 | Unit Weight of Concrete: | 150.0 | pcf |
| Rebar at the bottom of the concrete pad: | | | | |
| Qty. of Rebar in Pad (L): | 27 | Qty. of Rebar in Pad (W): | 27 | |
| Rebar at the top of the concrete pad: | | | | |
| Qty. of Rebar in Pad (L): | 27 | Qty. of Rebar in Pad (W): | 27 | |
| Apply 1.35 factor for e/w Per G: | 1.35 | | | |




**Soil Design Parameters:**

| | | | | | | |
|---|---|---|---|---|---|---|
| Water Table B.G.S. (ft): | 99.0 | Unit Weight of Water: | 62.4 | pcf | Angle from Top of Pad: | 30 |
| Ultimate Bearing Pressure (psf): | 60000 | Ultimate Skin Friction: | 0 | Psf | Angle from Bottm of Pad: | 25 |
| Consider Friction for O.T.M. (Y/N): | No | Consider Friction for bearing (Y/N): | No | | Angle from Bottm of Pad: | 25 |
| Consider soil hor. resist. for OTM.: | No | Reduction factor on the maximum soil bearing pressure: | 1.00 | | | |

**Foundation Analysis and Design:** Uplift Strength Reduction Factor: 0.75 — Compression Strength Reduction Factor: 0.75

| | | | |
|---|---|---|---|
| Total Dry Soil Volume (cu. Ft.): | 0.00 | Total Dry Soil Weight (Kips): | 0.00 |
| Total Buoyant Soil Volume (cu. Ft.): | 0.00 | Total Buoyant Soil Weight (Kips): | 0.00 |
| Total Effective Soil Weight (Kips): | 0.00 | Weight from the Concrete Block at Top (K): | 0.00 |
| Total Dry Concrete Volume (cu. Ft.): | 2600.00 | Total Dry Concrete Weight (Kips): | 390.00 |
| Total Buoyant Concrete Volume (cu. Ft.): | 0.00 | Total Buoyant Concrete Weight (Kips): | 0.00 |
| Total Effective Concrete Weight (Kips): | 390.00 | Total Vertical Load on Base (Kips): | 455.30 |

**Check Soil Capacities:**

| | | | | Load/ Capacity Ratio | |
|---|---|---|---|---|---|
| Calculated Maxium Net Soil Pressure under the base (psf): | 2976 | < | Allowable Factored Soil Bearing (psf): 45000 | 0.07 | OK! |
| Allowable Foundation Overturning Resistance (kips-ft.): | 4163.0 | > | Design Factored Momont (kips-ft): 1714 | 0.41 | OK! |
| Factor of Safety Against Overturning (O. R. Moment/Design Moment): | 2.43 | OK! | | | |

**Check the capacities of Reinforceing Concrete:**

| | | | |
|---|---|---|---|
| Strength reduction factor (Flexure and axial tension): | 0.90 | Strength reduction factor (Shear): | 0.75 |
| Strength reduction factor (Axial compresion): | 0.65 | Wind Load Factor on Concrete Design: | 1.00 |

Concrete Pad:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| One-Way Design Shear Capacity (L-Direction, Kips): | 1697.7 | > | One-Way Factored Shear (L-D. Kips): | 43.4 | 0.03 | OK! |
| One-Way Design Shear Capacity (W-Direction, Kips): | 1697.7 | > | One-Way Factored Shear (W-D., Kips) | 43.4 | 0.03 | OK! |
| One-Way Design Shear Capacity (Corner-Corner. Kips): | 1912.8 | > | One-Way Factored Shear (C-C, Kips): | 364.2 | 0.19 | OK! |
| Lower Steel Pad Reinforcement Ratio (L-Direct. ): | 0.0009 | OK! | Lower Steel Pad Reinf. Ratio (W-Direc | 0.0009 | | |
| Lower Steel Pad Moment Capacity (L-Direction. Kips-ft): | 5392.2 | > | Moment at Bottom ( L-Direct. K-Ft): | 19.8 | 0.00 | OK! |
| Lower Steel Pad Moment Capacity (W-Direction. Kips-ft): | 5392.2 | > | Moment at Bottom ( W-Direct. K-Ft): | 19.8 | 0.00 | OK! |
| Lower Steel Pad Moment Capacity (Corner-Corner,K-ft): | 7610.0 | > | Moment at Bottom ( C-C Dir. K-Ft): | 27.9 | 0.00 | OK! |
| Upper Steel Pad Reinforcement Ratio (L-Direct. ): | 0.0009 | OK! | Upper Steel Reinf. Ratio (W-Direct. ): | 0.0009 | | |
| Upper Steel Pad Moment Capacity (L-Direction. Kips-ft): | 5392.2 | > | Moment at the top (L-Dir Kips-Ft): | 32.7 | 0.01 | OK! |
| Upper Steel Pad Moment Capacity (W-Direction. Kips-ft): | 5392.2 | > | Moment at the top (W-Dir Kips-Ft): | 32.7 | 0.01 | OK! |
| Upper Steel Pad Moment Capacity (Corner-Corner. K-ft): | 7610.0 | > | Moment at the top (C-C Direc. K-Ft): | 191.4 | 0.03 | OK! |

## PROJECT INFORMATION

**SITE INFORMATION:**

| | |
|---|---|
| LATITUDE: | 41.77216 N |
| LONGITUDE: | 72.87996 W |
| GROUND ELEVATION | 447.0'± AMSL (PER GOOGLE EARTH) |
| STRUCTURE HEIGHT | 105.0'± AGL (TYPE: MONOPOLE) |
| ZONING JURISDICTION | TOWN OF AVON, CT |
| ZONING DISTRICT/OCCUPANCY | RESIDENTIAL (R-30) |

**APPLICANT:**

T-MOBILE
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

**PROPERTY OWNER:**

AVON WATER COMPANY
93 WEST MAIN STREET
CLINTON, CT 06413

**TOWER OWNER:**

SBA TOWERS, LLC.
8501 CONGRESS AVENUE
BOCA RATON, FL 33487

SBA SITE ID: CT01498-S SBA SITE NAME: AVON

**SBA CONTACT:**

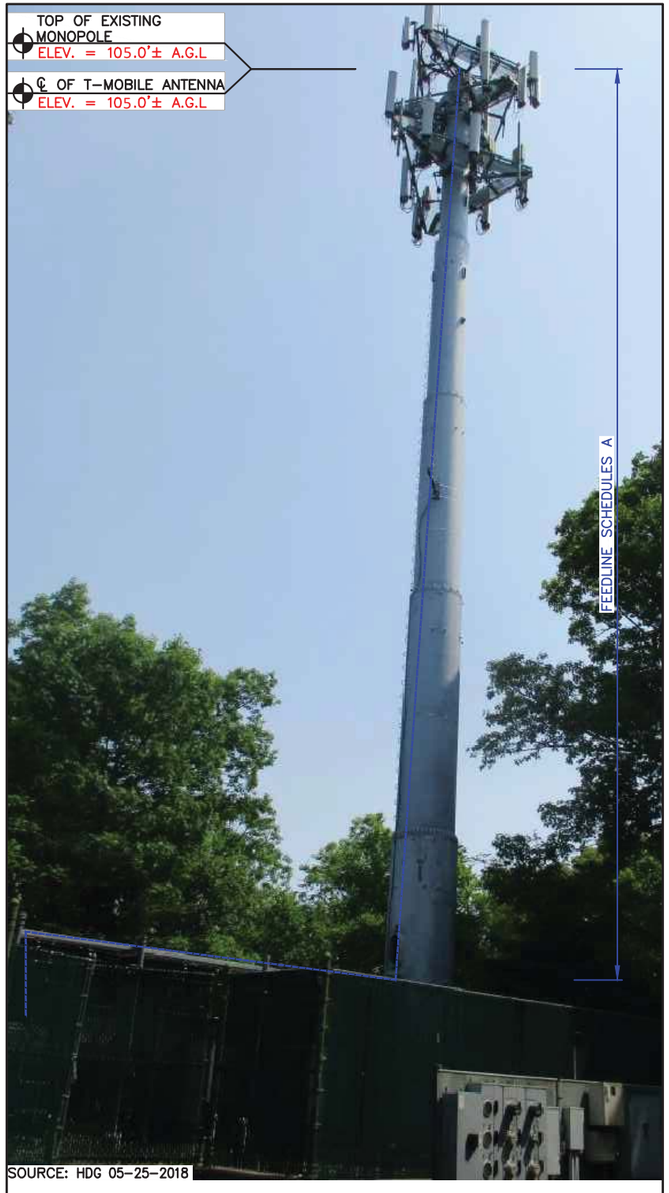
STEPHEN ROTH
SRoth@sbasite.com
(860)539-4920

## VICINITY MAP N.T.S.


## CODE COMPLIANCE

1. BUILDING CODE: IBC 2012 WITH 2016 CT STATE BUILDING CODE AMENDMENTS
2. TIA-EIA-222-G
3. NFPA 70 2014 – NATIONAL ELECTRIC CODE

BASED ON INFORMATION PROVIDED BY T-MOBILE, THIS TELECOMMUNICATIONS EQUIPMENT DEPLOYMENT IS AN ELIGIBLE FACILITY UNDER THE TAX RELIEF ACT OF 2012, 47 USC 1455(A), AND IS SUBJECT TO AN EXPEDITED ELIGIBLE FACILITIES REQUEST/REVIEW AND ZONING PRE-EMPTION FOR LOCAL DISCRETIONARY PERMITS (VARIANCE, SPECIAL PERMIT, SITE PLAN REVIEW).




SOURCE: HDG 05-25-2018

### FEEDLINE SCHEDULE

| FEEDLINE SCHEDULE | FEEDLINE DESCRIPTION | LOCATION |
|---|---|---|
| A | INSTALL: (1) 1-5/8" 6X12 HCS HYBRID CABLE<br>INSTALL: (1) 1-5/8" 9X18 HCS HYBRID CABLE<br>EXISTING TO REMAIN: (6) 1-5/8" COAX<br>EXISTING TO REMAIN: (5) INTERACTIVE 1-5/8" COAX<br>EXISTING TO REMAIN: (1) 1-1/4" 9X18 HCS HYBRID CABLE<br>EXISTING TO REMOVE: (1) INACTIVE 1-5/8" COAX | MOUNTED INSIDE MONOPOLE |

NOTE:
EXISTING T-MOBILE EQUIPMENT FEEDLINE INVENTORY BASED ON OBSERVED FIELD CONDITIONS, RFDS AND FEEDLINE LEASING ENTITLEMENTS MAY DIFFER.

**TOWER ELEVATION PHOTO DETAIL** 1/A-1
SCALE: N.T.S

# SITE NAME: SBA AVON/RT 177

## 10 REDWOOD LANE
## AVON, CT 06001

# T-MOBILE SITE NUMBER: CT11380C

## RF DESIGN GUIDELINE: 67D92DB

### T-MOBILE TECHNICIAN SITE SAFETY NOTES

| LOCATION | SPECIAL RESTRICTIONS |
|---|---|
| SECTOR A: ANTENNA/TMA/RRH | ACCESS NOT PERMITTED |
| SECTOR B: ANTENNA/TMA/RRH | ACCESS NOT PERMITTED |
| SECTOR C: ANTENNA/TMA/RRH | ACCESS NOT PERMITTED |
| GPS/LMU: | CAUTION: OSHA-APPROVED PORTABLE 10' STEP-LADDER REQUIRED |
| RADIO CABINETS: | UNRESTRICTED |
| PPC DISCONNECT: | UNRESTRICTED |
| MAIN CIRCUIT D/C: | UNRESTRICTED |
| NIU/T DEMARC: | UNRESTRICTED |
| OTHER/SPECIAL: | NONE |


SOURCE: HDG 05-25-2018

**EQUIPMENT PHOTO DETAIL** 2/A-1
SCALE: N.T.S


**T-MOBILE NORTHEAST LLC**
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

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WESTBOROUGH, MA 01581
TEL: (508) 251-0720
FAX: (508) 251-1755

Hudson Design Engineering PLLC
29 HAMM ROAD
HUDSON, NY 12534
TEL: (978) 557-5553
FAX: (978) 336-5586


STATE OF CONNECTICUT
DEREK J. CREASER
No. 23555
LICENSED PROFESSIONAL ENGINEER

CHECKED BY: JC

APPROVED BY: DJC

### SUBMITTALS

| REV. | DATE | DESCRIPTION | BY |
|---|---|---|---|
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| | | | |
| 2 | 08/16/18 | ISSUED FOR CONSTRUCTION | CL |
| 1 | 08/06/18 | ISSUED FOR REVIEW | CL |
| 0 | 07/19/18 | ISSUED FOR REVIEW | AM |

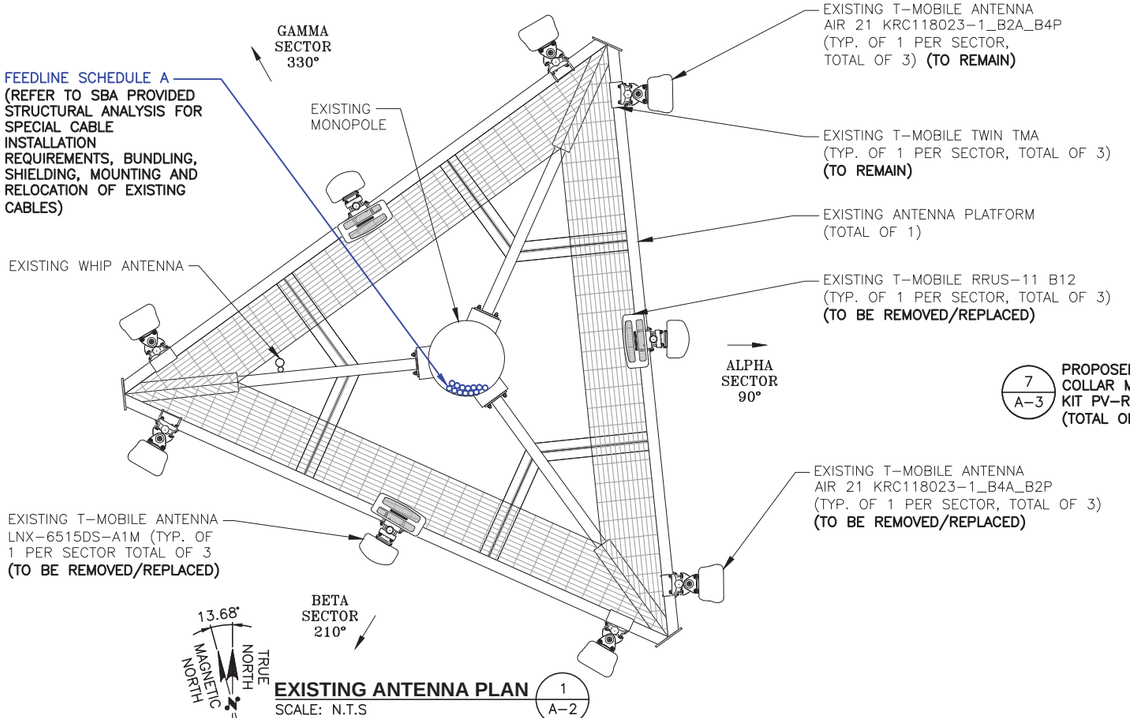
SITE NUMBER:
CT11380C

SITE NAME:
SBA AVON/RT 177

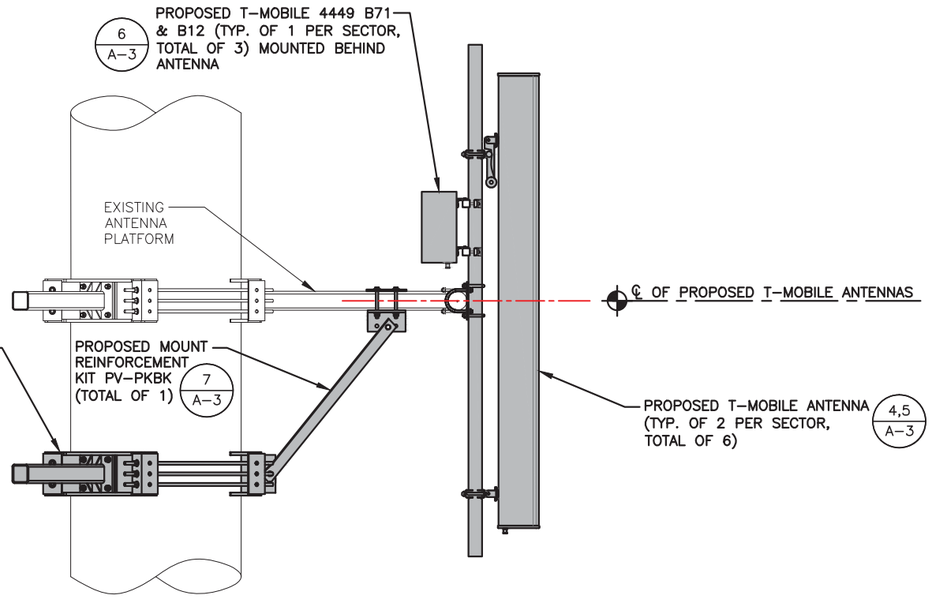
SITE ADDRESS:
10 REDWOOD LANE
AVON, CT 06001
HARTFORD COUNTY

SHEET TITLE
TITLE SHEET, ELEVATION & EQUIPMENT PHOTO DETAIL

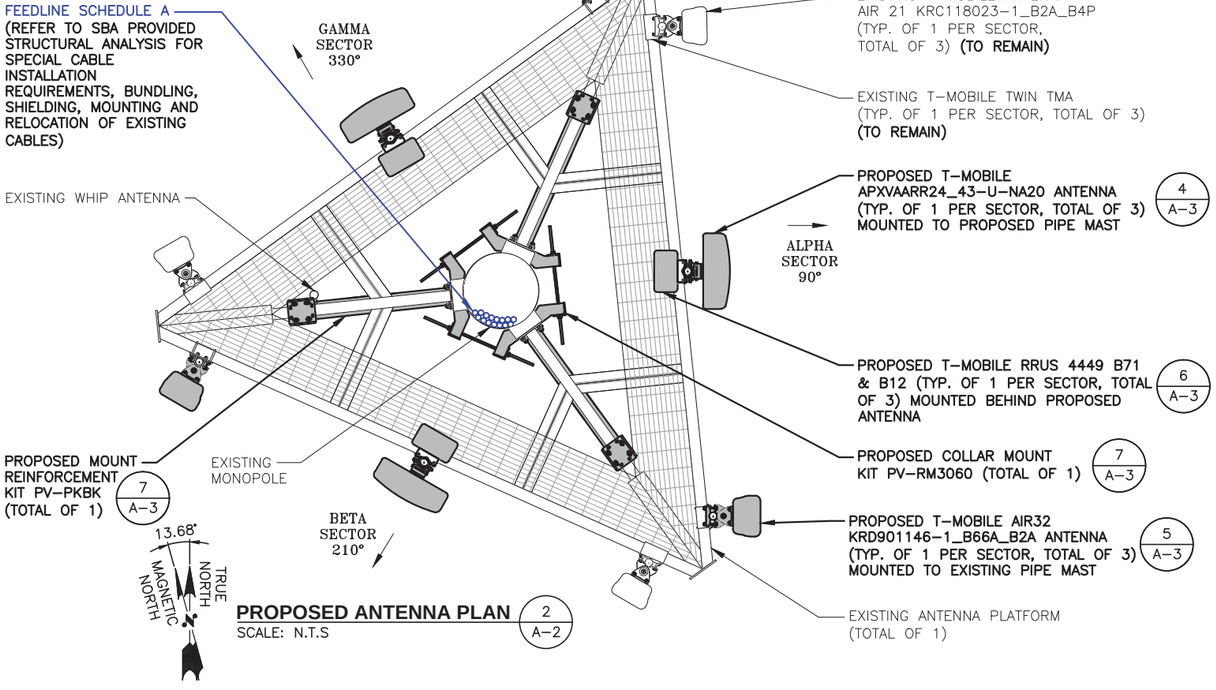
SHEET NUMBER
A-1



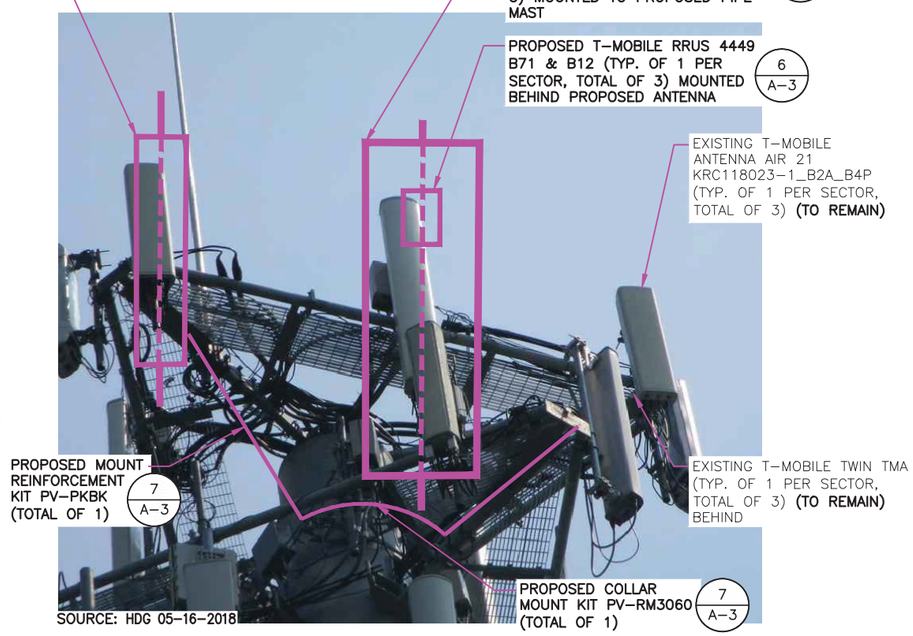

**EXISTING ANTENNA PLAN** (1 / A-2)
SCALE: N.T.S




**ANTENNA & RRUS MOUNTING ELEVATION** (3 / A-2)
22x34 SCALE: 3/4"=1'-0"
11x17 SCALE: 3/8"=1'-0"
0 8" 1'-4" 2'-8" 4'-0"




**PROPOSED ANTENNA PLAN** (2 / A-2)
SCALE: N.T.S




SOURCE: HDG 05-16-2018

**ANTENNA & RRUS MOUNT PHOTO DETAIL** (4 / A-2)
SCALE: N.T.S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SITE NUMBER:
CT11380C

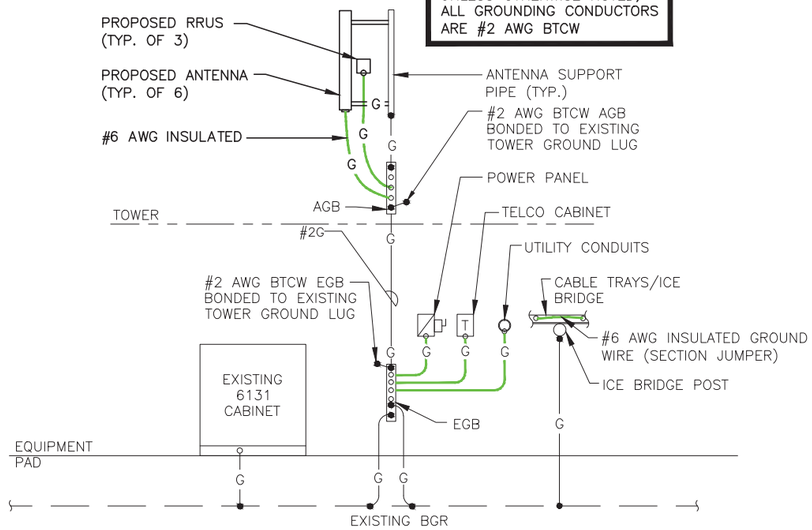
SITE NAME:
SBA AVON/RT 177

SITE ADDRESS:
10 REDWOOD LANE
AVON, CT 06001
HARTFORD COUNTY

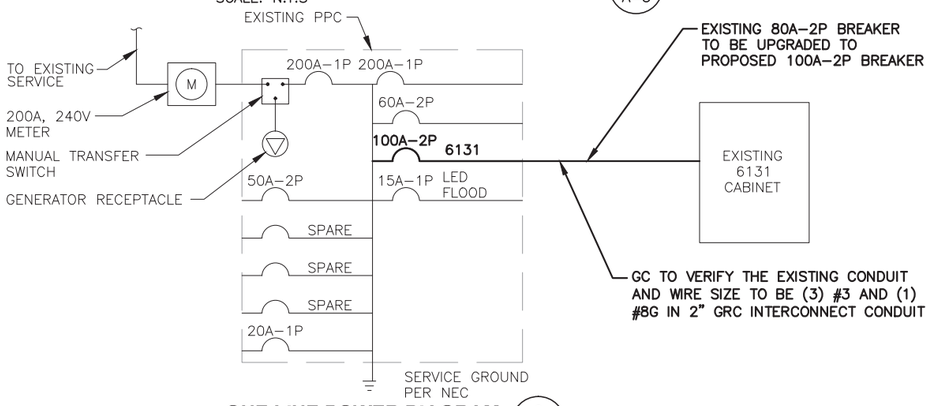
SHEET TITLE
TOWER ELEVATIONS, ANTENNA PLAN, & DETAIL

SHEET NUMBER
A-2

NOTE:
UNLESS OTHERWISE NOTED, ALL GROUNDING CONDUCTORS ARE #2 AWG BTCW




## TYPICAL GROUNDING RISER DIAGRAM (1 / A-3)
SCALE: N.T.S




## ONE LINE POWER DIAGRAM (2 / A-3)
SCALE: N.T.S


SOURCE: HDG 05-25-2018

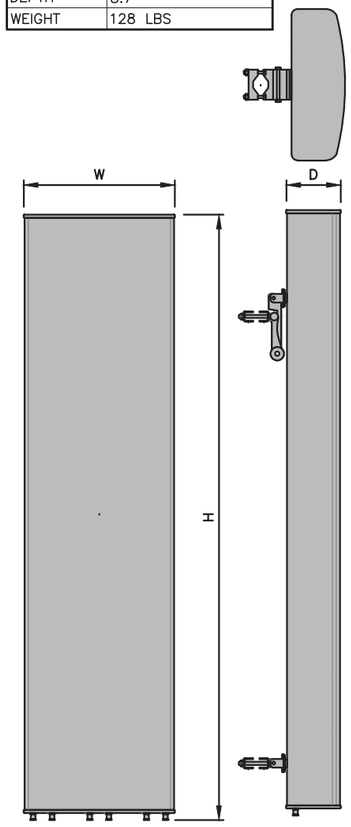

SOURCE: HDG 05-25-2018

SOURCE: HDG 05-25-2018

EXISTING 80A–2P BREAKER TO BE UPGRADED TO PROPOSED 100A–2P BREAKER

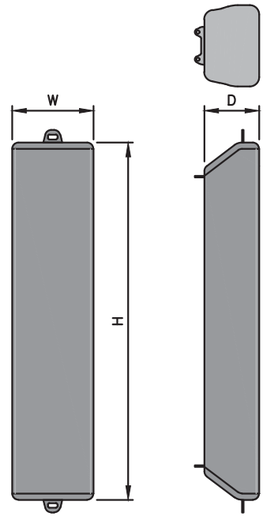
## PHOTO DETAIL: PPC PANEL (3 / A-3)
SCALE: N.T.S

| L600 ANTENNA DIMENSIONS | |
|---|---|
| MODEL # | APXVAARR24_43-U-NA20 (OCTA) |
| MANUF. | RFS |
| HEIGHT | 95.9" |
| WIDTH | 24" |
| DEPTH | 8.7" |
| WEIGHT | 128 LBS |



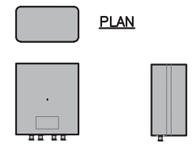

## L600 ANTENNA DETAIL (4 / A-3)
SCALE: N.T.S

| AIR3246 ANTENNA DIMENSIONS | |
|---|---|
| MODEL # | AIR32 KRD901146-1_B66A_B2A (OCTA) |
| MANUF. | ERICSSON |
| HEIGHT | 56.6" |
| WIDTH | 12.9" |
| DEPTH | 8.7" |
| WEIGHT | 132.2 LBS |

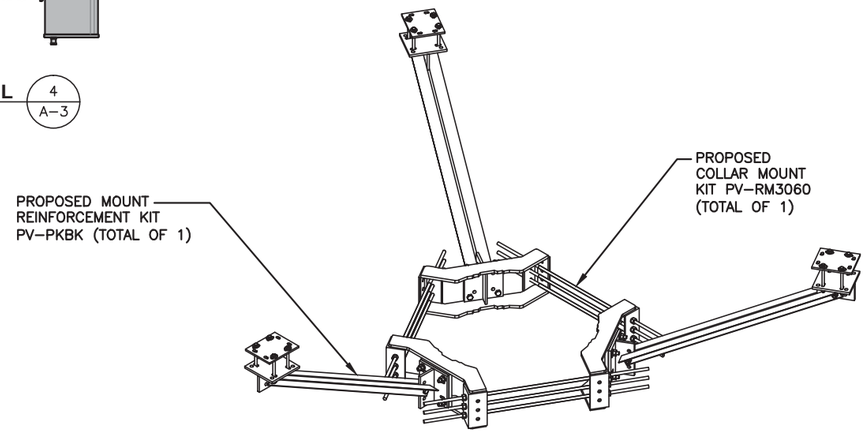



## AIR3246 ANTENNA DETAIL (5 / A-3)
SCALE: N.T.S

| RRUS DIMENSIONS | |
|---|---|
| MODEL # | RRUS 4449 B71 & B12 |
| MANUF. | ERICSSON |
| HEIGHT | 14.9" |
| WIDTH | 13.1" |
| DEPTH | 9.2" |
| WEIGHT | 74 LBS |




## PROPOSED RRUS DETAIL (6 / A-3)
SCALE: N.T.S




## PROPOSED REINFORCEMENT KIT DETAILS (7 / A-3)
SCALE: N.T.S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SITE ADDRESS:
10 REDWOOD LANE
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HARTFORD COUNTY

SHEET TITLE
CONSTRUCTION DETAILS & ONE-LINE DIAGRAMS

SHEET NUMBER
A-3

## FINAL ANTENNA SCHEDULE

| SECTOR | BAND | ANTENNA MODEL | ANTENNA RAD | AZIMUTH | RADIOS | CABLE FEED LINES |
|---|---|---|---|---|---|---|
| ALPHA | G1900/U2100 | AIR21 KRC118023-1_B2A_B4P | 105'-0"± | 90° | (E) GENERIC TWIN STYLE 1B-AWS | (E) (2) 1-5/8" COAX |
| | L700/L600 | APXVAARR24_43-U-NA20 | 105'-0"± | 90° | (P) (1) 4449 B71&B12 | (P) (1) 6X12 SHARED HYBRID CABLE TRUNKS<br>(P) (1) 9x18 SHARED HYBRID |
| | L2100/L1900 | AIR32 KRD901146-1_B66A_B2A | 105'-0"± | 90° | | (E) HYBRID CABLE |
| BETA | G1900/U2100 | AIR21 KRC118023-1_B2A_B4P | 105'-0"± | 210° | (E) GENERIC TWIN STYLE 1B-AWS | (E) (2) 1-5/8" COAX |
| | L700/L600 | APXVAARR24_43-U-NA20 | 105'-0"± | 210° | (P) (1) 4449 B71&B12 | (P) (1) 6X12 SHARED HYBRID CABLE TRUNKS<br>(1) 9X18 SHARED HYBRID |
| | L2100/L1900 | AIR32 KRD901146-1_B66A_B2A | 105'-0"± | 210° | | (E) HYBRID CABLE |
| GAMMA | G1900/U2100 | AIR21 KRC118023-1_B2A_B4P | 105'-0"± | 330° | (E) GENERIC TWIN STYLE 1B-AWS | (E) (2) 1-5/8" COAX |
| | L700/L600 | APXVAARR24_43-U-NA20 | 105'-0"± | 330° | (P) (1) 4449 B71&B12 | (P) (1) 6X12 SHARED HYBRID CABLE TRUNKS<br>(1) 9X18 SHARED HYBRID |
| | L2100/L1900 | AIR32 KRD901146-1_B66A_B2A | 105'-0"± | 330° | | (E) HYBRID CABLE |
| (P) (1) 6X12 AND (1) 9X18 HYBRID CABLE, TRUNKS SERVES ANTENNAS ON ALL SECTORS (ALPHA, BETA & GAMMA) | | | | | | |

**FINAL ANTENNA CONFIGURATION TABLE** 1/A-4
SCALE: N.T.S


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SHEET TITLE
ANTENNA SCHEDULE

SHEET NUMBER
A-4